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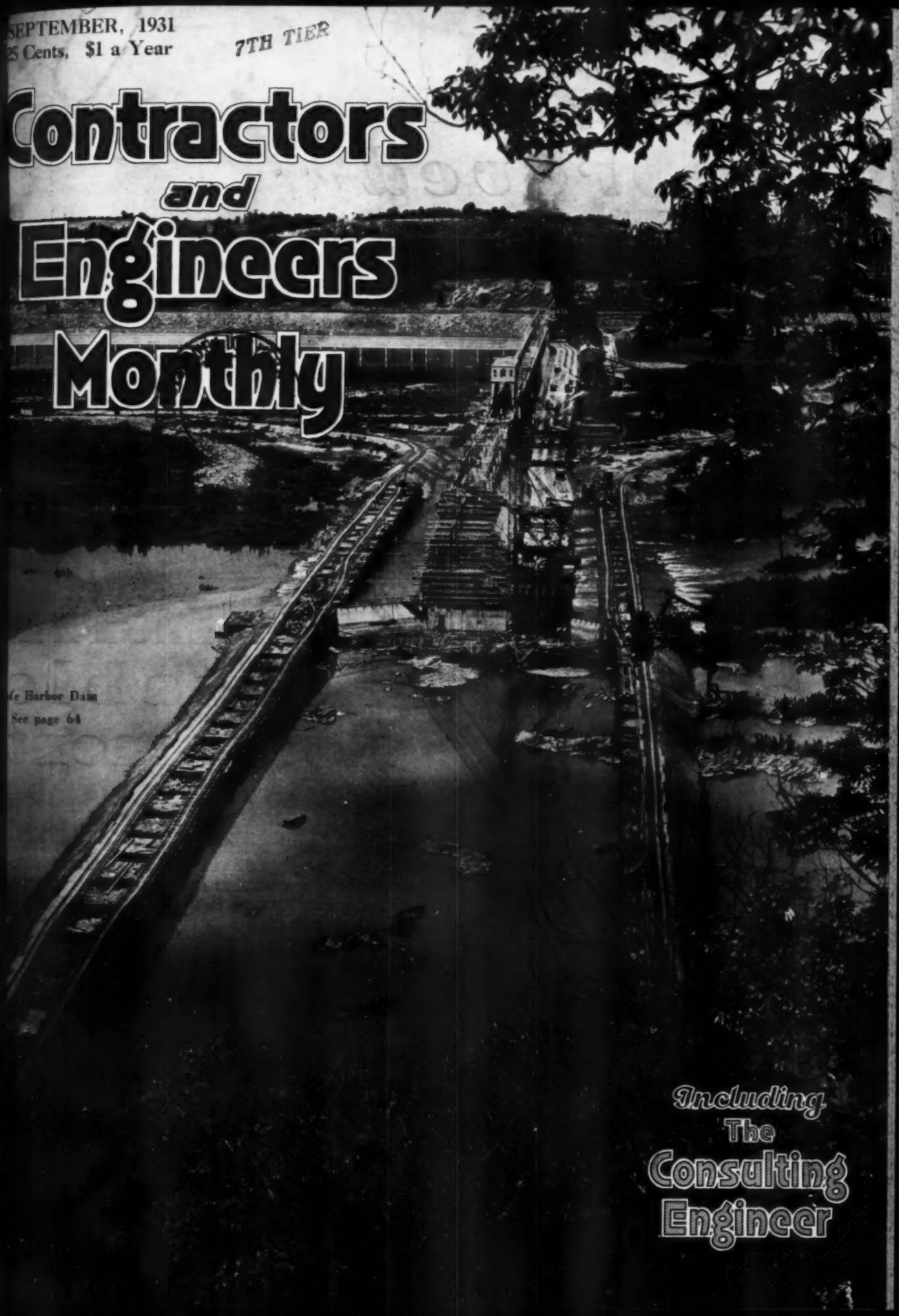
# Contractors and Engineers Monthly



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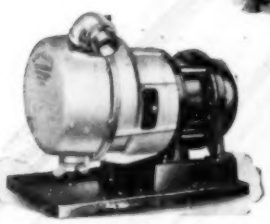

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# *Building the*

# Boundary Channel Bridge

***Methods and Organization***

***Used by***

***Merritt-Chapman & Scott Corp.***

***on the***

***Largest of Twelve Bridges***

***on the***

***Mt. Vernon Memorial Highway***

*Pulling Long Horizontal Reinforcing Bars Into Place*

LOCATED about one-eighth mile west of the Virginia end of the Fourteenth Street Bridge over the Potomac River from Washington, D. C., the Boundary Channel Bridge is the first of a group of twelve bridges of unusual design and decorative character to adorn the Mt. Vernon Memorial Highway which, when completed, will connect the Virginia end of the Arlington Memorial Bridge with Washington's home at Mt. Vernon. This scenic boulevard is under construction with a complete elimination of grade crossings, with parking areas at the most interesting points, and with bridges faced with hand-dressed granite and mica schist for architectural effect. The Boundary Channel Bridge is at the south end of Columbia Island and is a reinforced concrete cantilever structure having a channel space of 100 feet with wing walls 75 feet in length and carrying a 60-foot roadway and two 6-foot sidewalks.

The structure is composed of seven reinforced concrete arch girders and two outside arch girders or trusses of structural steel encased in concrete. From the piers the arch crossing the stream is cantilevered and carries an unusually large amount of heavy reinforcing, making the placing of the concrete a difficult piece of work. Back of the pier there is an anchorage section to stabilize the structure during construction and in case of a settlement of the fill. Five eye bars carry the load of the cantilever section back to the anchorages. These are masked by a solid wall of concrete faced with granite masonry. All the face stone was required to be set and then backed by concrete giving a heavy, solid structure.

### Foundation Excavation

Excavation for the foundation of the piers and wing walls was started November 28, 1930, by the derrick dredge Nixon using a Hayward 1½-yard orange peel bucket handled by an A-frame derrick. A total of 49,297 cubic yards of mud with a small amount of stiff clay at the bottom was removed between elevations —4 and —31. The spoil was removed by a fleet of four barges, only two of which were in use at any one time, and disposed of by dumping in an old sand and gravel working in the Potomac River about 1¼ miles

below the job. The excavation was completed January 22, 1931.

### PILE DRIVING

The unusual character of the bottom in which the foundation is located is shown by the experience with the original test piles and the failure of the work to check the results of the tests. Two locations for test piles were chosen at random, one on either side of the channel. Both test piles were driven to refusal and stopped at the same elevations so that 60-foot piling was ordered. When the driving of the 1,048 piles began, it was soon discovered that the bottom was exceedingly irregular and piles up to 80 feet had to be purchased. There was as great a variation in depth as 10 feet vertically within a distance of 5 feet laterally.

*Grover C. Denny, Superintendent*

On January 2, 1931, the driving of the piles began using a No. 11 B-2 McKiernan-Terry steam hammer. This floating pile driver known as No. 7 is built so that either a No. 9 B-2 or a No. 11 B-2 steam pile hammer can be used with the same rigging. The leads for the No. 11 B-2 hammer are built in front, with the leads for the No. 9 B-2 hammer immediately behind and the latter hammer working in the same space used by the larger hammer. The hammer can be slipped out of the leads and a 60-foot extension for the No. 11 B-2 hammer attached for underwater driving. With the underwater leads removed, a spud can be attached for a circular saw which can cut as deep as 60 feet under water. The superintendent and the operator are proud of the record made in driving piles on this job. Not only was there a high number driven each day but without any special preparation in one 8-hour day a total of 105 piles from 65 to 70 feet in length were driven.

### FLOATING WALERS AND SHEET PILING

As soon as the pile driving was completed the floating walers which had been assembled on the bank were launched and moored in position as guides for the Larssen steel sheet piling. A single ring of 8 x 12-inch timber formed the floating waler for each pier. The strength of the Larssen No. 2 piling made possible the use of the light walers even with a clear vertical span of 17 feet when the dams were unwatered. The steel sheet piling was used in lengths of 30, 32 and 40 feet. The two shorter lengths were a little short for the work but proved satisfactory when driven alternately with the 40-foot lengths to act as stiffeners. The piling was driven so that the top elevation was about uniform.

There were two dams for each side of the channel, one for the pier foundation and the other slightly shallower for the wing walls. The pier dam measured approximately 87 x 41 feet and the wing wall and anchorage dam, which was H-shaped, measured 44 x 9 feet for each of the verticals of the H and with a 64 x 10-foot dam for the cross piers. These were made tight with the usual application of cinders on the outside.

### THE CHICAGO PLACES THE UNDERWATER SEAL

The deep dam for the piers was sealed first by the floating concreting plant Chicago using a tremie. Then the shallow dam was sealed. The separation of the two dams was made possible by the use of T-piles as connections. The seal on the deeper dam was 8 feet thick and on the other 4 feet thick. The seal concrete was specified for volumetric measurement using 12.11 cubic feet of sand, 19.12 cubic feet of 1½ down to ¾-inch gravel and 8 bags of cement. The temperature of the water was only 40 degrees Fahrenheit when the first seal was poured but the test cylinder showed the requisite strength in 11 days and the dam was pumped out. This first seal was poured on the north side; the shallow seal on the same side was poured under similar conditions but when it was time to pour the south side the weather had warmed up considerably, making earlier pumping possible. The dams were pumped with two 4-inch Jaeger centrifugals, one powered with a Hercules engine and the other with a Waukesha engine. A Pulsometer was also used and the entire main dam unwatered in 4 hours.

The Chicago is a complete floating concreting plant assembled on a barge 120 feet long, 40 feet wide and 13 feet deep overall. At one end is the cement shed capable of holding 2½ cars of cement. Here three men cut and emptied the Lone Star cement from the paper bags into a skip car that was pulled up an inclined track to the charging hopper where it dumped automatically by tripping over the ends of the rails which were bent up into hooks which caught and held the front wheels. As the car is not out in the open for more than a few seconds it is not covered against rain.

A Blaw-Knox 51-ton bin is mounted at the far end from the cement house and is served by a stiffleg derrick clamming the sand and gravel from barges tied alongside, using a Hayward 1-yard bucket. Like all other equipment of this contractor, the entire barge is steam operated. Beneath the bins is mounted the Smith 31-S non-tilting mixer which discharges into the bucket of the 75-foot Insley steel tower or direct into an Insley bottom-dump concrete bucket as required.

The crew of the Chicago consists of the three men in the cement house, one man on the batchers, one man mixing and dumping the concrete, one man on the cement hoist, a fireman and an engineer on the materials derrick, two men placing buckets and the foreman.

The aggregate for this job was furnished by the Smoot Sand & Gravel Co. of Washington, D. C., all the material being dredged from the Potomac River. The sand was brought 13 miles by barge and the gravel 7 miles. The aggregates were tested by the engineers of the U. S. Bureau of Public Roads either at the dredges or alongside the concreting barge.

Following the placing of the underwater seals and the pumping of the dams the piles were cut at elevations —8.25 down to —17.25. All the sawing was done with a Wolf pneumatic saw for which air was furnished by a locomotive-type Westinghouse Air Brake Co. compressor.

### REINFORCING AND FORMS

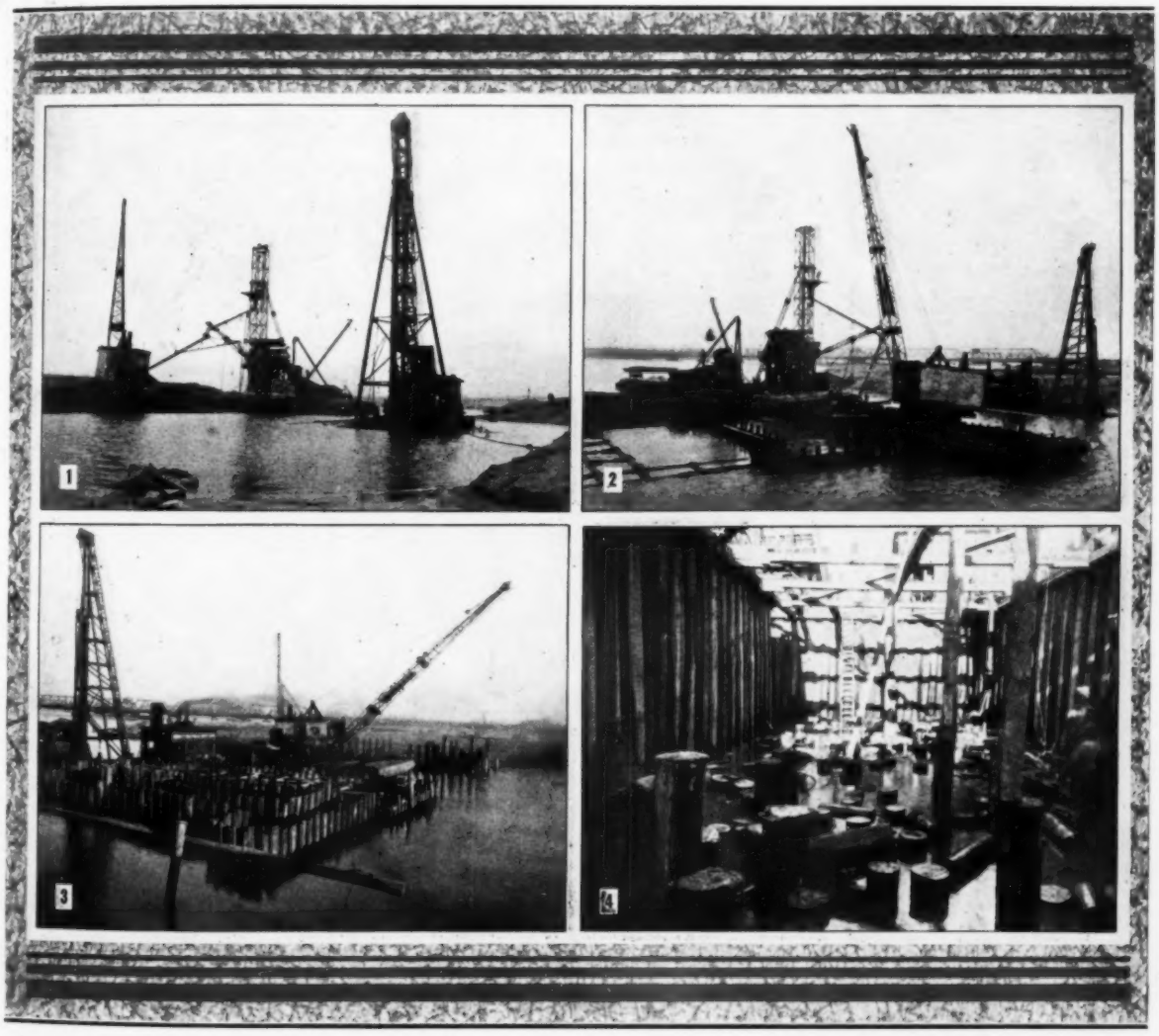
As mentioned above, the reinforcing in this structure was unusually heavy, being up to 1¼-inch steel in lengths up to 60 feet long. The reinforcing was furnished by the Kalman Steel Co. of Chicago, and was unloaded from railroad cars to a barge at the dock of the Smoot Sand & Gravel Co. by one of the two Wiley-Whirleys which were used for all material handling on the job except the loading of the aggregate bins, which was done by the concreting barge derrick. All reinforcing in place was tied by No. 16 tie wire twisted tight with pliers.

The foundation concrete consisted of 11.85 cubic feet of sand, 19.5 cubic feet of gravel and 6 bags of cement. It was conveyed from the Insley tower with chutes where they would reach conveniently. Beyond the range of the chute the concrete was placed by a bucket.

Throughout the form work on this job 1¼-inch tongue and groove or dressed and matched lumber was used. Although a very dry concrete was used the forms were not vibrated but the concrete was worked into the maze of reinforcing by spading, tamping and treading. A carpenter crew of 18 men handled the form work and from 10 to 12 men worked on the concrete placing aside from the barge crew.

### ARCH BEAM CONSTRUCTION WITH PRELOADING OF THE CENTERING

The concrete arch beams forming the span were 2 feet wide and, at the spring line, 21 feet deep. The load of concrete was so great that the arch centers for



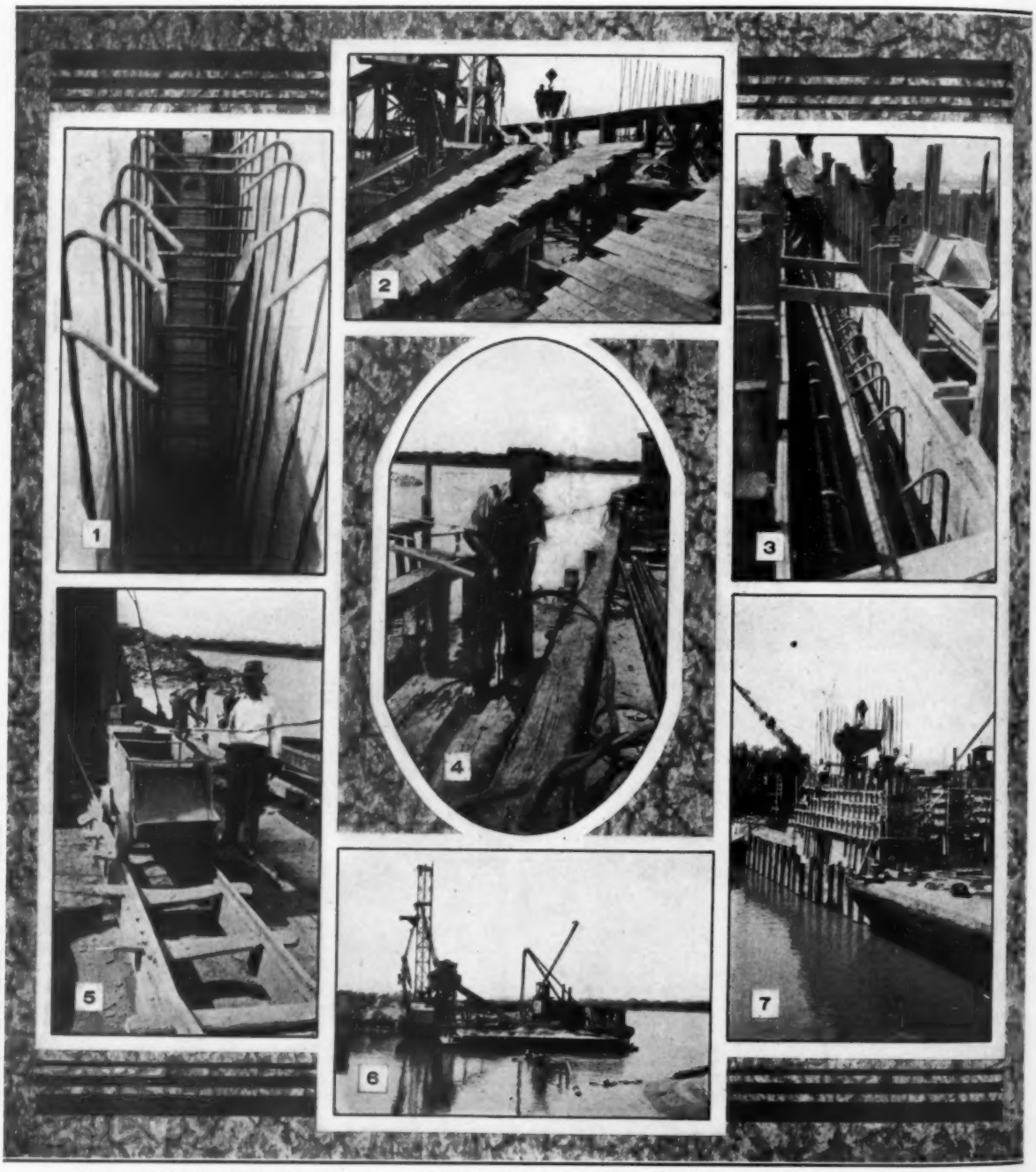

*PILE DRIVING OPERATIONS AND POURING SEAL CONCRETE FOR THE FOUNDATIONS OF THE BOUNDARY CHANNEL BRIDGE*

*1. The pile driver getting into action. 2. Pouring tremie concrete after the completion of one section of steel sheet piling. At the left are seen the floating walers for the next section of steel sheet piling. 3. Driving of all-steel sheet piling on one side of the Boundary Channel completed and work started on the second side. The Fourteenth Street Bridge from the District of Columbia to Virginia is seen in the background. 4. Piles cut off inside the steel sheet cofferdams after the pouring of the tremie concrete and unwatering of the dam*

the forms were built in 8-foot spans. The first 8-foot horizontal span required three 8 x 12's, the second two 8 x 12's and one 4 x 12, the third span three 6 x 12's and the fourth span two 6 x 12's. The pile bents for the channel section of the arch beams where preloading was required in the specifications were driven in pairs with caps, two piles to each cap and a slip joint between caps so that the preloading of one arch beam would not affect the adjacent beams.

Tanks were used for the preloading which was divided into 12-foot sections. The first section was preloaded with 9 tons per arch beam, the next 12-foot section back toward the haunch with 13 tons and the third with 25 tons. The tanks were unloaded as the concrete was poured.

(*Continued on page 59*)

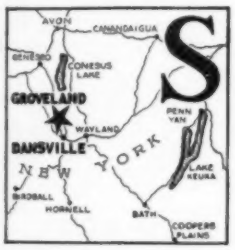



*FORM WORK, REINFORCING AND CONCRETING ON THE BOUNDARY CHANNEL BRIDGE*

*1. A view near the haunch of one of the arch beams showing the vertical reinforcing. The arch rings are 21 feet deep at the haunch. The short horizontal bars are reinforcing for a cross diaphragm between adjacent arch beams. 2. Falsework for the arches. 3. The top reinforcing in one arch beam. 4. Pneumatic drills made the boring of holes through heavy timbers an easy process. 5. The cement skip on the Chicago. 6. The Chicago at rest after an intensive day pouring concrete on the Boundary Channel Bridge. 7. Pouring concrete from a bottom-dump bucket to the superstructure of a wing wall*

*Truck Haulage of Batch Boxes and Use of Bulk Cement Featured State Highway Job Near Dansville, N. Y.*

# Running 2,000 Feet of Concrete Slab a Day




STARTED November 16, 1929, under the then existing specifications, it was somewhat of a shock in 1931 to run into a concrete paving job using volumetric measurement of aggregates. But the Canty, O'Neil & Candell contract No. 5723 for 7.67 miles of 8-7-8-inch pavement 18 feet wide running north of Dansville, N. Y., provided plenty of interest in the way of the most up-to-date methods. A new bulk cement handling plant was in use, breaking it in for the next contract of the same company near Geneseo, N. Y., which is being built under 1931 specifications which require paper bags or bulk cement. Then there was also the hauling of the batches in steel boxes by truck, eliminating the use of dump trucks.

### Three Shovels on Grading

The right of way for the new road was over an old earth road with about 20 per cent relocation to improve the grade and alignment. The only rock excavation on the job was for the culverts and bridges. This was in a disintegrated rock that was handled readily by shovel and hand work. There were twelve bridges on the job with the spans running as high as 50 feet.

Excavation was started within ten days of the signing of the contract on November 6, 1929. Three shovels were moved in and the contractor put in two of his own teams and wagons and two trucks to set the pace for the fleet of hired teams and trucks that ran as high as fifteen per shovel on the long hauls. The shovels used were a Bucyrus-Erie 1-yard gas+air and two Osgood Conquerors, one with a 1-yard and the other with a ⅞-yard bucket. Later an Erie steam shovel with a ⅝-yard bucket was moved in to handle the cleaning up along the shoulders. By this time the other shovels were off the grading and two were sent to the new job and the third, equipped with a ¾-yard clamshell bucket, was working at the batcher plant handling aggregate.

The hauling fleet for the shovels varied from three to fifteen trucks and teams at each shovel depending on the length of haul. The average haul for the job was about 1,000 feet but the haul went as high as 2 miles on one section. The contractor used hand trimming on

### Pavement Record

| | |
|---|---|
| *Started May 7, 1931, at 1:00 P. M.* | |
| *Finished July 3, 1931* | 57½ *days* |
| *Total paving hours, 456½ hours, =* | 45.65 *10-hour day* |
| *Total number of 10-hour days on which mixer was not started* | 12 *days* |
| *Sundays* | 8 *days* |
| *Rainy days* | 4 *days* |
| *Actual paving days excluding Sundays and days of no start* | 45½ *days* |
| *Total number of part days lost because of rain and breakdown* | 3½ *days* |
| *These part days were made up by working overtime on the good days* | |
| *Total number of cubic yards of pavement placed* | 16,437.66 *cubic yards* |
| *Average for 57½ actual days* | 285.87 *cubic yards* |
| *Average for 45.65 10-hour days* | 360.08 *cubic yards* |
| *Average linear feet per 10-hour day* | 1,729 *feet* |

*The Blaw-Knox Batching Plant with an Osgood Crane. In the Foreground Loading Cement in Batch Boxes from Bags Before the Bulk Cement Plant Was Used*

all the dumps aided by an Adams grader with a 10-foot blade hauled by a Caterpillar Sixty. This same outfit was run over the entire job as work progressed and handled all of the rough grading. There were five or six laborers on each dump. All of the fills were rolled by one of the two 10-ton Buffalo-Springfield steam rollers on the job.

### Batching Plant Near Center Point of Job

The project ran from Dansville to Groveland and the batching plant was located at West Sparta which was near the center of the job and about one-half mile from the work. Preparation of the fine grade was handled in the same sequence as the final paving. The pavement was poured first in one 9-foot strip from the road leading to West Sparta to Dansville. Then the second strip was poured in the same direction. Following this the first strip was poured in the direction of Groveland from the West Sparta road and finally the second strip.

Gravel was used as coarse aggregate, the sizes running according to New York State specifications as No. 1, 2, and 3 stone. The screen sizes for those stones are: No. 1, ⅜ to ¾-inch; No. 2, ¾ to 1½-inch; and No. 3, 1½ to 2¾-inch. Both sand and gravel were received by rail from the Canawaugus plant of the Valley Sand & Gravel Co. Sand was shipped in gondola cars and was clammed out at the batching plant by the Osgood crane with a 50-foot boom and either stockpiled or placed directly in the Blaw-Knox batcher. The gravel was received in hopper-bottom cars and was dumped into a pit at the batcher and clammed out to the stockpile or to the batcher bins.

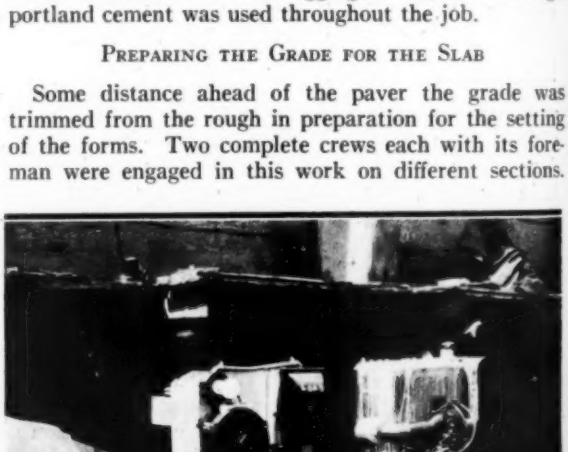
The area available at the siding was about 40 feet wide and sufficiently long to handle one day's requirements of cars of cement and aggregates. The trucks with their two Lakewood steel batch boxes drove in past the storage shed and thence under the Blaw-Knox bulk cement plant where they received the weighed-out equivalent of seven bags of cement in each box and then drove forward under the batcher plant where they were loaded with gravel and sand. Then the trucks backed out from the batcher around the sand stockpile and then turned right and drove forward out to the connecting road.

Before the bulk cement plant arrived and for about one-half the job cement in cloth bags was used as permitted in the 1929 specifications. While this was done there were three men loading the cement into the batch boxes at the cement cars. When the shift was made to bulk cement two extra men were required. The same three men were used in the cement cars unloading bulk cement into the hopper with the power scoop. While two men can normally handle this work a third was held in reserve all the time to relieve the others because of the heat in the steel cars and the great amount of dust. The remainder of the plant was operated by one man with a mechanic at hand to keep it in condition. The cement was unloaded by the power scoop and dumped into an enclosed elevator made by H. W. Caldwell & Son Co. of Chicago, from the receiving hopper. This elevator delivered the cement to the bin above, from which it was fed by a screw conveyor to the weighing batcher. Because of the packing of the cement, a small portable air compressor was maintained on the plant to blow the cement to "fluff" it just before the plant was started each day. In spite of the added labor in operating the complete bulk cement plant the contractor realized a considerable saving over the use of the more expensive paper bags which would be required had the job been run under the present specifications.

A Westinghouse, Novo-powered portable electric outfit was installed alongside the storage shed to furnish power for the operation of the bulk cement plant which was handled entirely by push buttons for loading and dumping. The weighing was controlled by the screw conveyors delivering the cement to an indicating scale made by the Richardson Scale Co. of Clifton, N. J. At all times there were two men working in the aggregate cars and one man on the aggregate batcher. Lehigh portland cement was used throughout the job.

### Preparing the Grade for the Slab

Some distance ahead of the paver the grade was trimmed from the rough in preparation for the setting of the forms. Two complete crews each with its foreman were engaged in this work on different sections.



*The Westinghouse-Novo Electric Plant Which Supplied Current for the Bulk Cement Plant*

*The Electrically-Operated Blaw-Knox Bulk Cement Plant*

The first had two trucks and a team, the Erie steam shovel and six men in the outfit. There was also a Wehr one-man power grader working with this unit. The second grading crew consisted of twelve men and one team. Eight-inch Blaw-Knox and Hotchkiss steel forms were used for the 9-foot strips when the first slab was run and only one set of forms when the second was poured as the first strip served as the form for one side.

A foreman and eight men handled the setting of the forms; four men cut the trench for the forms and four others handled the actual setting. Following these a Lakewood subgrader was pulled over the section on the forms by a 5-ton Buffalo-Springfield roller which also handled the final rolling of the grade for the concrete. Between the form setting crew and the paver was a crew of twelve men, all hand labor, trimming the grade to final elevation and checking with scratch-boards.

### Water Supply for the Paver and Curing

Water for the various operations was supplied by a Barnes triplex pump which was set up at two different locations to handle the water needs. It pumped through 2½ and 2-inch pipe in which taps for the paver hose were set every 160 feet. The paver carried 150 feet of 1½-inch hose which was suspended from a boom laid on top of the paver so as to clear the second strip in which the batch trucks operated while the paver ran down the strip being poured between the forms. One man was used all the time on the paver hose to prevent any trouble or delay to trucks in passing the paver to turn. This man and one from the steel crew handled the moving of the hose from tap to tap as required.

### Placing the Concrete

Just ahead of the paver a man was used to oil the forms. The final grade was rolled so thoroughly and was so firm that the crawlers on the MultiFoote 27-E paver did not disturb it in the least. Because of the great care taken in the preparation of the subgrade the men who are frequently seen touching up the grade just behind the paver were not needed on this job.

As the trucks drove up the outer strip they were controlled by the two men at the paver who dumped the batch boxes into the paver skip. After the second box was dumped the truck went beyond, turned at the most convenient location and then returned and waited its chance to get by the paver when the next truck was moving up. On the paver were two men, one to operate the paver and the other to handle the batch box hoist.

Behind the paver there were two men spading and two striking off 2½ inches below the top for the Truscon fabric reinforcing. As required by the specifications there was a scratch-board behind the paver and this was pushed ahead by the strike-off men each time the paver moved ahead. There were two men to handle the reinforcing from the shoulders, where it was strung along ahead of paving, and place it in the slab at the proper time. The slab was finished by a Lakewood screed with one man operating it and one man on each side shoveling to the strike-off. There were two hand finishers who used the wooden belt and did the edging. A bridge which just fitted across the forms was left for the use of the man who cut the expansion joints, did the final edging and brooming. The finishers were careful to replace all tools as used on the platforms at the sides of the finishing machine so that they would be ready for instant use and not be strung along the right of way.

### Curing the Slab

The slab on this job was cured in two different ways. The first half of the job was cured with Curcrete, an

(Continued on page 61)

*Swinging a Batch Box from a Truck to the Paver Skip*

# Wide Shoulders *of* Illinois Roads *a* Blessing *to* Contractors

## *Henry Zolper & Sons, Like Other Illinois Contractors, Used Sides of Road for All Hauling Purposes to Speed Work*

*Loretta Zolper Spends a Happy Half Hour Riding the Crane at the Batching Plant*

IN some of the Eastern States the shoulders of the roads are so narrow that they are practically useless as far as expediting the work of the paving contractor is concerned. This has led to the general adoption of the 10-foot strip paving, so that not only the contractor's trucks, but general traffic may be maintained through the road during construction. In Illinois, however, the shoulders are wide enough so that local and construction traffic can be driven through the right of way by using the shoulders. All the contractor's trucks for hauling forms, pipe and reinforcing use the shoulders, and they form an excellent parking space for the cars belonging to the laborers on the job.

The paving job of Henry Zolper & Sons of Mendota, Ill., on Route 69, Section 124, from Route 23 west to the town of Serena, was no exception to the shoulder traffic rule. The road was only 3.38 miles long of 20-foot pavement with a section of 9-7-9 inches, but the organization of the contractor was complete and poured a full 1,100 feet of slab in a 10-hour paver day. The major, and in fact the only, difficulty on the job was the delivery of the aggregates from a local commercial pit. Due to machinery troubles the pit was unable at times to deliver the full requirements of the contractor. Trucks from the pit delivered the gravel and sand to the stockpiles of the contractor in the town of Serena.

An Osgood crane with a 45-foot boom and a Williams ¾-yard clamshell bucket loaded the Johnson bins and batchers direct from the stockpiles. One pit man handled the ground work around the stockpiles, cleaning up so that the crane could move freely around the piles. A single batch man weighed and dumped the batches, checking the condition of the tail gates of the trucks and giving each truck driver a ticket for his load. The hauling fleet consisted of eight trucks owned by

*Emptying Sacks on the Batches and Baling Sacks Near the Paver*

the contractor and seven which were hired. They were all one-batch trucks of various makes with both single and dual pneumatic tires on the rear. The trucks ran frontwards or backed under the batchers to receive the proportioned aggregates, according to the whim of the drivers. The single batches consisted of: 2,346 pounds of gravel, 1,304 pounds of sand and six bags of cement, this dry weight being changed with the moisture content. The cement was added in the bags by three men in the cement car about 300 feet from the batchers. When the car was just being opened the men tossed the bags directly from the car onto the batch, but when the car was partially empty they wheeled the six sacks on a hand truck and stacked the sacks at the door, then tossing them onto the trucks as they arrived.

### Work on the Grade

The rough grade was cut with an Austin Rip Snorter grader having a 12-foot blade and pulled by a Caterpillar Sixty. This cut the grade to approximately the required elevation for the fine grade crew to work easily. Such high spots as were left by the rough grade crew were cut with a Euclid rotary scraper operated by a Caterpillar Twenty. A Wehr one-man power grader with an 8-foot blade cut the grade next to the forms to the final cross section and also trimmed the grade. A Ted Carr Formgrader cut the form trench accurately to line and grade, and then the two form setters and their two helpers set the 9-inch Heltzel steel forms. Following this operation the Carr subgrader was pulled over the grade on the forms by the Caterpillar Twenty. The grade was thoroughly rolled with a 5-ton Galion roller to furnish a firm foundation for the slab. Behind the subgrader there was a crew of twelve men who shoveled the excess earth onto the shoulders and generally trimmed up the grade.

### The Paving Outfit

As the batch trucks approached the paver they turned through a space left for that purpose in the forms. Then they stopped at a small platform, where two men emptied the six sacks of cement onto the aggregates. These men were located about 500 feet from the paver. At the paver one man dumped the batches and was required to perform considerable work not found on most jobs. As the sand was received almost direct from the washers it was rather wet and was batched in this condition. This caused the sand to stick readily to the bottoms of the trucks and the dump man had to shovel considerable material from the trucks into the skip.

The MultiFoote 27-E paver pulled a Carr subgrade planer from which two men shoveled the excess earth and one sprinkled the subgrade. A scratch template was pulled by the paver immediately behind the subgrade planer. The steel man set the marginal bars immediately behind the scratch template. The bars, dowels and center steel were all carried on the scratch template where they were convenient for the two setters. The oil bucket for the lubrication of the marginal bars was also carried on the template. The marginal bars were ⅞-inch in diameter, and were set in stamped metal chairs so that they were 6 inches from the form and 4½ inches up from the bottom of the slab. They were 26 feet long and lapped 1 foot in double chairs supporting two bars at one time, with a clear space of 1 inch between the bars.

Truscon center steel was used with the ½-inch diameter dowels, 4 feet in length, run through the center strip at intervals of 5 feet. The center steel was in 10-foot lengths, and was supported by four pins through it in each length. The pins were each 14 inches long and were driven by hand vertically into the grade.

Three puddlers, who also spaded along the forms to

*The Batching Plant Consisting of an Osgood Crane, Williams Clamshell Bucket, and Johnson Bins and Batchers*

*Pulling the Longitudinal Float from a Double Bridge*

prevent honeycomb in the concrete, were busy spreading the 2-inch slump concrete. The water worked to the surface of the slab very quickly, probably due to a very fine sand as the inspector reported that the water was correct in the batches that were being run at the time this job was visited. The operator of the Ord finishing machine attended to the shoveling of the concrete to the strike-off of the machine as required.

The 12-foot longitudinal float was worked by two men from a double rolling bridge which spanned the forms. The float was worked from the center to the side, and then lifted to the center again and worked to the other side. The float was so pulled as to give a herringbone pattern to the slab. The two finishers first straight-edged the slab with the 10-foot checking straight-edge, and then used a long-handled float to pull off any laitance and to knock down any high spots, as this contract was run under the new specifications that penalized the contractor one square yard of pavement in the final estimate for every bump in the slab more than ⅛-inch, according to the checking machine. This consisted of a series of sharpened bolts set to give a tolerance of ⅛-inch when the machine was wheeled over the slab in the four tracks used by two-lane traffic and down the center. After the checking with the straight-edge by the finishers they used a long-handled float if necessary where low spots were found. A shovelful of fresh concrete from the puddle was cast over the area and then worked into the slab to overcome the depression. After the checking straight-edge showed an accurate slab the concrete was belted and then edged. The surface of the slab was broomed behind the belt. The pavement was built with a 1-inch crown.

Back of the finishers were the burlap men. These two men spread the strips of wet burlap which was later sprinkled. One man was employed to sprinkle the previous day's run of burlap until it was removed and the pavement checked for bumps. Three men then pulled the forms and one cleaned them for the truck. Two helpers loaded them and hauled them forward for the form setters.

A common scheme used by the finishers on concrete slabs in this section of the country to overcome the small blemishes on the slab that have not been removed by the longitudinal floats, nor the belts, is a small trowel firmly attached to the end of a 10-foot pole, usually of bamboo. This is manipulated out over the slab and the small poor spots taken out with remarkable skill and speed. The handle of a small 2 x 3 trowel is inserted in the hollow center of the bamboo pole and then wedged and bound securely.

### Expansion Joints

Illinois is continuing the use of the 4-inch poured expansion joint spaced 800 to 1,000 feet apart. The expansion board or box form was made of wood and set in the slab and staked with four stakes on the side near the paver. These stakes were made with lugs about 2 inches from the top and at a height so that they would be above the concrete when the slab was poured on the second side. The lugs were used in pulling the stakes. A mattock or pick was placed under the lug using the expansion board as a fulcrum and the pins pulled without any delay.

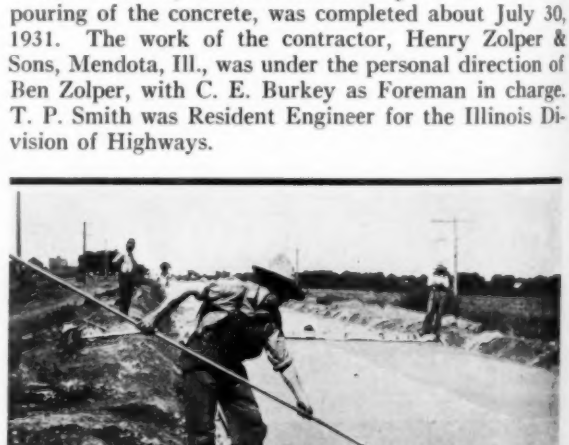
On the first pass over the expansion joint the finishing machine ran as though there was no difference in the slab. Then before the second pass one of the puddlers went back and shoveled the concrete from the top of the board, and the finishing machine went back only to the near side of the box and worked forward from there. Thus the top of the box was not covered a second time. The expansion boards were pulled the evening of the day of pouring, or early the next morning when the air was cool as they came out quickly and easily while the concrete was cool and contracted.

### Providing Water for the Work

A Novo duplex pump, set up on the bank of a small stream near the right of way, supplied sufficient water for all the work through a line of 2½-inch pipe laid along one shoulder. To provide taps for the paver hose valves were set in the line at intervals of 250 feet, and the paver carried 150 feet of 1½-inch hose.

### Personnel

This contract, which was started June 19 with the pouring of the concrete, was completed about July 30, 1931. The work of the contractor, Henry Zolper & Sons, Mendota, Ill., was under the personal direction of Ben Zolper, with C. E. Burkey as Foreman in charge. T. P. Smith was Resident Engineer for the Illinois Division of Highways.



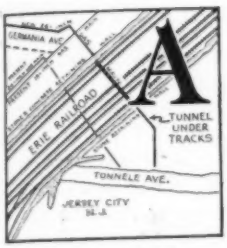
*Broom-Marking the Top*

# Wet Grounds

## *Did Not Delay*

## *Driving of Gas Pipe Tunnel*

### *A 6-Foot Diameter Liner Plate Tunnel Completed Under Four Main Line and Two Freight Tracks of Erie Railroad in Jersey City, N. J.*



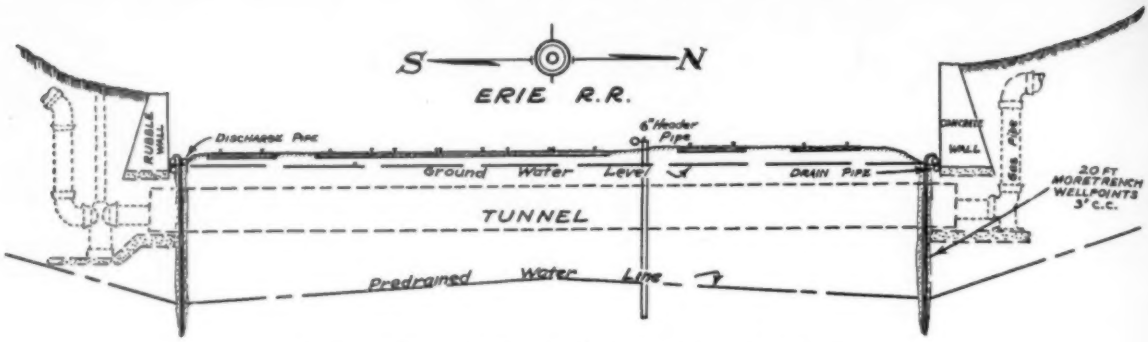

AS one of the preliminary operations to the construction of a new concrete-encased steel plate girder bridge over the main line tracks and the freight tracks of the Erie Railroad at Tonnele Avenue, Jersey City, N. J., on U. S. Route 1 leading to the Holland Tunnel Plaza, the contractor was required to relocate the crossing of a 24-inch gas main. The work, which was done for the Public Service Electric & Gas Co. of New Jersey through a joint contract with the Erie Railroad, required two shafts 14 to 18 feet deep and a steel liner plate tunnel 95 feet long in wet ground.

Work was started on October 15, 1930, and completed in 40 working days. The new crossing is about 100 feet west of the old tunnel which was abandoned as the footings of the center piers for the new skew bridge and the abutments interfered with the line. The north shaft was excavated 24 feet wide, as the 24-inch gas pipe was placed through this shaft. The south shaft was 15 feet wide, this being sufficient to make the installation of the riser and valve box without crowding. In both cases the shafts were excavated back of the existing retaining walls, concrete on the north side and rubble on the south. The center line of the tunnel is about 2 feet below the bottom of the two retaining walls. The back of the north shaft was excavated as the wood sheet piling was driven. Some difficulty was experienced with the wood sheet piling when sand was struck near the bottom of the shaft.

#### Handling Ground Water

The elevation of the ground water was about 3 feet above the top of the tunnel, making it necessary to draw down the water by means of well points in order to handle the tunneling operation successfully. A total of 24 Moretrench well points were driven to a depth of 19 feet below ground level along the freight tracks at the north side of the operation. These were distributed evenly for a distance of 50 feet east and west of the center line of the tunnel. This system which was connected up to a 6-inch header and a Moretrench pump was successful in keeping the excavation dry until the last 10 feet of tunnel when an additional 14 well points,

*Interior of the Liner Plate Tunnel During Construction*




*Section of Gas Pipe Tunnel Showing Location of Well Points*

header and pump were used between the freight and passenger tracks and then another line of well points at the south wall. These well points had 144 square inches of drainage surface per point.

### Excavating the Tunnel

At the entrance to the tunnel on the north side a concrete box 6 feet, 6 inches square, inside dimensions, was built, the base of the box acting as a foundation for the riser pipe pedestal. In the tunneling operation rings composed of five sections of Commercial Pressed Steel Co. plates fabricated in Youngstown, Ohio, were used. The plates were formed of No. 11 gage steel and were bolted together on the internal flanges with 6 bolts per plate. The final dimension of the tunnel ring is 5 feet, 8 inches in diameter, outside measurement.

A shield 8 feet long and 6 feet, 8 inches wide was used and was jacked ahead 4 inches on each shove with from one to four Duff hand-operated, 15-ton jacks. The shield was built with two 4-inch vertical I-beams with a stiffener against which the jacks operated. For the first 15 feet of the work the shield was blocked against the back of the shaft and after that the block-

(*Continued on page 56*)

*SCENES NEAR CROXTON JUNCTION, JERSEY CITY, N. J., ON THE ERIE RAILROAD, BENEATH WHICH THE 72-INCH LINER PLATE TUNNEL FOR THE 24-INCH GAS MAIN WAS DRIVEN*

*1. One of the pumps on the well-point system located between the freight and passenger tracks. 2. A view across the railroad showing the shaft on the north side. 3. The well-point pump near the north concrete retaining wall. 4. A view along one of the 6-inch headers showing the frequency of placing well points*

# Stabilize Your Finances

## *by* Separate Accounts

## *for* Each Job

By

**J. E. Gregory, C. P. A.**

***Farrington, Hyland & Gregory***

***Certified Public Accountants***

***New York City***

*This is the ninth of a series of twelve articles appearing monthly during* 1931, *covering tax, accounting and system problems as applicable to the contractor.*

*Particular problems relative to either methods of accounting or tax matters may be directed to the offices of Farrington, Hyland & Gregory, Certified Public Accountants, Chrysler Building, New York City, or to* CONTRACTORS AND ENGINEERS MONTHLY, 470 *Fourth Avenue, New York City.*

THE matter of the trusteeship position of the contractor as regards his creditors has already been discussed in a previous article. With the signing of each sizeable contract the contractor really becomes merely the recipient of funds, the greater portion of which he receives and holds temporarily for the account of those creditors who have assisted him in the undertaking. A full appreciation of this fact is essential toward the proper financing of each contract and the stabilization of the business of the contractor.

To properly carry these thoughts into effect it would be advisable for the contractor to open a special bank account upon the signing of each new contract and to advance thereto sufficient funds to enable him to carry on for approximately one month, or to the date of the first requisition.

Since each requisition theoretically contemplates the amount of work completed to that date the cash received from the owner upon the requisition should be sufficient to pay for all labor and materials utilized to that date together with any subcontractors' billings and any other costs, leaving an excess of cash in the bank representing the contractor's cash profit to that point.

As each new requisition is mailed and the cash thereon received all costs are similarly paid for and the bank balance in turn increases, so that when the contract is completed the balance remaining in the bank represents the contractor's profit plus his original cash advance for the first month's operations.

Only too often does it happen that the initial funds derived from the early requisitions of the latest contracts are utilized to pay off creditors' accounts resulting from a prior and completed job. The result is a constant overlapping of funds that should have been kept intact.

### A Separate Corporation for Each Job

It has been advocated, and with much merit, that each new contract be undertaken in the title of a separate corporation and the funds be kept entirely separate. Furthering this thought in practice, one of our clients formed four corporations, three of which were operating companies, the fourth a holding company. The names of all were closely akin so that the principal name was constantly before the public. At the time of organizing these corporations it was decided that no more than three large jobs would be undertaken during any period and that the three corporations would be financed, banked and treated always as separate units. The advantages proved themselves later as is evident from the following recital of facts.

Corporations A and B were well along and completely secure in the matter of their jobs while Corporation C had practically completed a $750,000 contract for a corporation client who became insolvent. Corporation C had some $415,000 coming from this contract and owed

some $275,000 to creditors and subcontractors. A meeting of all of the creditors and subcontractors on this job together with the directors of the C Corporation, all parties to which meeting became jointly interested, decided upon certain actions that would have ordinarily been left to the directors of the corporation itself. The result of such joint action, a statement of the full accounting of the job by the directors in furtherance of their trusteeship obligation having been presented, was to the effect that any monies collected should be apportioned fairly between all creditors, and strange to say, the most amicable of relations were held with all creditors.

Had the contract been handled in the regular course together with the other contracts in progress in one corporate title it is obvious that the creditors would have pressed for payment regardless of the faithlessness of the customer for which all were working.

### The Banker a Helpful Trustee

The banker is only too pleased to become the trustee in these matters at the outset of a job, and to lend his advice and counsel in matters of this kind. He would rather finance separate jobs and know how his loaned funds were being utilized than to make a general loan. The lawyer is pleased to draw into effect the subcontract and material contract forms explicitly appointing the banker trustee and embodying the understanding that all creditors and subcontractors will be paid out of the funds derived from the job upon which they are engaged, as received.

The subcontract and material creditors take kindly to the thought that their interests are being furthered by their own banker, and all in all the benefits are manifold.

With conditions as they are, contractors coming into being overnight, and bidding becoming a cut-throat affair, this method seems to be one measure for insuring financial stability and assuring a continuance of the survival of the fittest.

## Cutting Construction Costs

THIS is the title of a 35-page report prepared by the Special Risk and Engineering Department of the Hartford Accident & Indemnity Co. and is of interest to all contractors, engineers and those interested in construction and contracting activities. In the brief introduction to this report is the statement:

"Accidents cost the construction industry millions of dollars annually. The provision of compensation insurance coverage in no way relieves the contractor of his share of the cost of the accidents, which is variously estimated at between four and five times the amount paid out by the insurance companies. This cost is due to non-insurable losses such as: time lost by the supervisory force through the investigation of accidents, training of new employees to take the injured's place, attending hearings on compensation cases and in preparing records; time lost by the injured through receiving first aid or doctor's treatment and in recovering from the injury; time lost by other employees rendering assistance to the injured, etc. In addition to these losses, accidents also make necessary an increase in compensation insurance rates.

"Believing that a firm policy in regard to accident prevention saves time and lowers costs, we have prepared this report to aid contractors in effecting the control of accidents. If it provides its readers with helpful information, we shall be well repaid for the careful investigation which preceded its issuance."

Copies of this booklet "Cutting Construction Costs" are available to the readers of CONTRACTORS AND ENGINEERS MONTHLY by writing to the Special Risk and Engineering Department, Hartford Accident & Indemnity Co., Hartford, Conn.

*An Effective Warning Sign*

## A Warning Sign That Warned

DURING the past summer, Liberto & Cerullo, Inc., of Depew, N. Y., built 22 miles of concrete pavement between Fredonia and Westfield, N. Y., and extending several miles west of the latter city. Such a long stretch of construction necessarily required long preparatory work on culverts which did not close the road to traffic but made it dangerous for the average driver who expects the entire right of way and the shoulders for his own use. In order to overcome the need for a long detour and still warn the automobile driver of the hazard that he was approaching, two large clearly lettered signs were erected, one at either end of the job. The accompanying picture shows one of these signs—they were identical—which stood fully 15 feet high and which was adequately illuminated at night.

At top and bottom the signs warned of DANGER so that no matter where the driver looked he was warned immediately of a hazard. The remaining wording is to the point and describes fully what the automobile driver may expect to find in the 22 miles ahead of him, machinery in the road, workmen on the roadway, one-way traffic requiring traffic signals, and a plea to the driver to protect himself and the workmen by careful driving.

We commend Liberto & Cerullo for the clarity of this sign. From time to time in these pages we have reproduced warning signs displayed by contractors. Some have been humorous, others were gruesome, and still others had an appeal to reason such as "Please Drive Carefully, Death Is So Permanent."

# Handling Concrete *with* Belt Conveyors *on a* Terminal Project

***A Roof 100 Feet Wide and 2,200 Feet Long Handling Heavy Traffic Poured with Minimum Preparation Expense by G. L. Tarlton of St. Louis***

THE new $15,000,000 Illinois Terminal Project, now under construction at St. Louis, Mo., consists of a terminal warehouse and depot located at 12th and Washington Streets, St. Louis. A subway runs under High Street, the street being the newly constructed roof of the subway. Under this roof will be railroad tracks serving two large newspaper buildings. This roof or street is 100 feet wide and 2,200 feet long, poured 10 inches thick of reinforced concrete, requiring about 5½ yards of concrete per running foot 100 feet wide, with 700 pounds of reinforcing steel per foot. The total concrete yardage in the roof is about 12,000, which is being poured in 20-foot sections.

### Handling 5-inch Slump Concrete

Portable conveyors were chosen by G. L. Tarlton, contractor, in preference to building a ramp or any other methods because they involved the least preparation expense, were reliable and made it possible to pour the roof naturally and with minimum effort.

A 1:2:4 mix of concrete of 4 to 5-inch slump was delivered from a central mixing plant in open agitator trucks, containing 2.1-yards each. The pouring schedule called for a load to be delivered every three min-

*Eight Portable Belt Conveyors Delivering Wet Concrete*

*The Final Conveyor Chuting Concrete to the Subway Roof of the Illinois Terminal Project in St. Louis*

utes during the working period. The conveyors were never overloaded. The belt speed was slowed down to suit the loading. To accommodate the distributing and tamping, about 1½ to 2 minutes was taken to discharge the concrete onto the first conveyor.

### Eight Conveyors for Pouring

The method of pouring was to advance in 20-foot sections and a total of eight Link-Belt portable belt conveyors were used, which gave a conveying line slightly more than 200 feet. The portable belt conveyors were 26 feet long, having a 24-inch belt, and were the standard conveyors except that a V-shaped scraper was applied to the return run. This rubber wiper kept the belt clean. The belt speed was 150 feet per minute, and the conveyors were not called upon to handle more than 1 to 1¼ yards of concrete per minute at angles up to that of the final conveyor, which was set at an angle of 20 degrees.

The labor involved for distributing the concrete consisted of eleven laborers, two hoisting engineers and one oiler. After a few days of experience, remarkable team work was developed by the crew and very few hitches occurred in the flow of concrete.

### Five Shifts Per Section

To accommodate the 100-foot width of pour, the conveyor line was moved about five times for each 20-foot section of floor length. This shifting required a slight delay, depending upon the number of conveyors in use at the time. Here team work was emphasized, as less than a minute was taken to move and line up a conveyor. To aid the resetting and lining up, each conveyor was provided with a wide hopper at the foot end to place the concrete properly on the belt. A complete 20-foot section, 100 feet wide, was poured in about 4½ hours. As each of the conveyors was independently powered by an 8-horsepower LeRoi engine, complete flexibility was maintained at all times.

### Personnel

The contract for the pouring of this roof slab was awarded to G. L. Tarlton, of St. Louis, for whom J. C. Hail is General Manager, and Frank Munro, General Superintendent. H. Merker, of Merker & Co., St. Louis, was the supervising engineer.

## Wet Grounds Did Not Delay Driving of Gas Pipe Tunnel

(*Continued from page 52*)

ing was placed against the flanges of the liner plates. Two 7-inch I-beams were used for blocking.

All mucking was by hand, four men being used for the entire operation of jacking, mucking and blocking. The muck was taken out in wheelbarrows and dumped in the bottom of the north shaft and during the day was hand cast up on two platforms. Extra labor handled this work during the day. The tunneling operation was continuous throughout 24 hours, using three shifts. The best progress was about 12 feet per shift.

### Installing the 24-Inch Gas Main

An invert of concrete approximately 15 inches thick was laid through the tunnel to set the grade of the pipe. The original plans called for setting a 6-inch channel beneath the pipe for the full length of the tunnel with the legs up to form a drain. This was not found necessary as the 0.5 per cent slope of the tunnel from north to south provided sufficient natural drainage so the channel was omitted. After the pipe was in place the remaining space was backfilled and tamped. Both hand and foot and pneumatic tamping were used, the two former seeming to be more successful under these conditions. With the pneumatic tamper working horizontally the earth fell from above because of the vibration and caused considerable delay. The workmen became very expert in using their feet for tamping, or better, packing the earth around the pipe and the final result met with the approval of the entire group of engineers. Pneumatic tampers were used to consolidate the fill at the crown of the tunnel.

### Personnel

This work was done for the Public Service Electric & Gas Co. through a joint contract with the Erie Railroad. For the Public Service the work was in charge of James Ashworth, Superintendent, and Carl J. Buschmann, Assistant to the Engineer. Parker & Graham, 50 Church Street, New York, were the contractors with Fred B. Mathews as Superintendent. A. B. Fowler, Resident Engineer of the Erie Railroad, was in direct charge of this work.

## The Twentieth Annual Safety Congress and Exposition

DURING the week of October 12 to 16, delegates from many construction companies of the United States will meet in the Stevens Hotel in Chicago to carry out a cooperative program to consider practical ways and means for the reduction of accidents and accident costs in the construction industry. This cooperative accident prevention program, as an important part of the Twentieth Annual Safety Congress and Exposition, will be conducted by the construction section of the National Safety Council. This section officially represents about 160 construction companies of the United States.

There will be four different session programs for this Section, during Tuesday, Wednesday and Thursday of Congress week. Another feature will be the Annual Safety Exposition in the large exhibit hall of the Stevens Hotel. More than a hundred exhibits will display a panorama of standard safety equipment and latest developments in safety appliances which will be of interest to the construction industry.

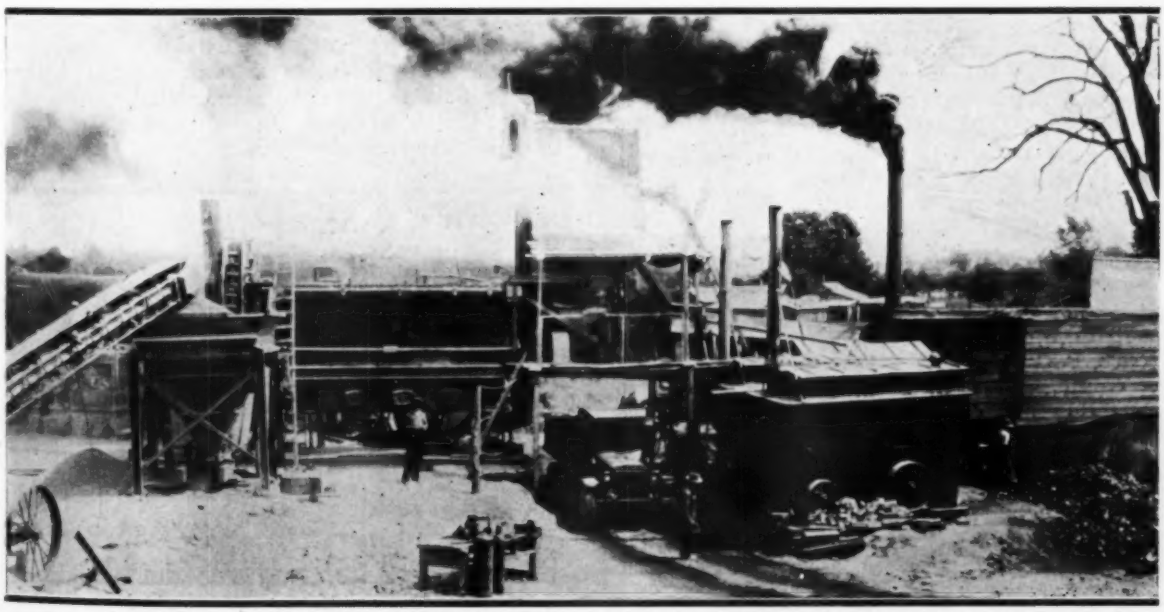
# Laying 12 Miles *of* Mixed Macadam *on a* King's Highway

## *Dufferin Paving & Crushed Stone, Ltd., Laid 800 Feet a Day With an Average 6-Mile Haul Using a Fleet of Seventeen Trucks*

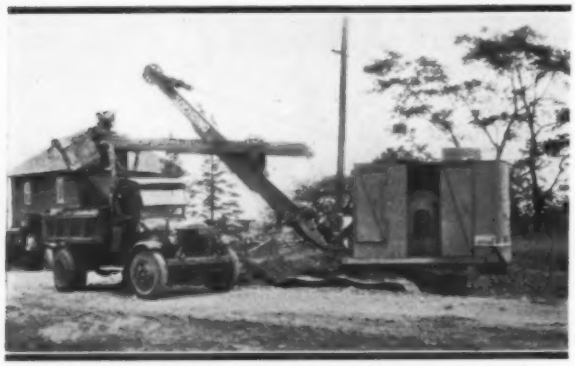
ONE of the longest paving contracts awarded for 1931 construction in Ontario was let to Dufferin Paving & Crushed Stone, Ltd., for a mixed macadam or black base pavement with a 21-foot bottom course 3 inches thick and a top course 20 feet wide and also 3 inches thick. On this contract the Department for the first time used pea gravel in the surfacing course with 8 per cent of asphalt. Also the maximum size stone permitted in the two-course mix was 1¼-inch, giving a denser pavement than with the earlier 1½-inch stone allowed.

### Asphalt Plant Located at Commercial Pit

A 2,500-yard Cummer asphalt plant run by a steam engine was set just off the main highway leading into Durham from the south and on the property of a com-



*The Cummer Asphalt Plant with Auxiliary Drier at the Left and Additional Kettles at the Right*



*A Koehring Shovel Making a Shallow Cut and Loading to One of the Fleet of Mack Trucks*

mercial sand and gravel producer. The contract for paving extended 12 miles south from the plant, with no dead haul but an unusually long average haul. This highway, No. 6, is a main north and south thoroughfare running from Hamilton on the south to Owen Sound, a popular summer resort on the north, a distance of 112.8 miles.

Sand for the plant was taken from a large stockpile maintained by the producer and carried by a 60-foot Barber-Greene belt conveyor to a steel hopper, from which it was fed by a continuous apron feeder to the standard bucket elevator of the Cummer plant to the regular drier. Gravel was loaded in hopper-bottom cars in the pit and shunted to a siding on the other side of the plant, where it was unloaded from a pit by a second Barber-Greene belt conveyor to a steel bin, and fed from there by a man controlling a gate, to a bucket elevator to a 70-ton Farasey auxiliary drier made by John Inglis Co., of Toronto. From the auxiliary drier the material mixed with the sand and went to the regular drier of the plant. A steam boiler next to the highway where it was easy to supply the coal was used both to furnish steam to the engine running the plant and to the kettles where the asphalt was melted and for heating the cars and running the asphalt pumps. The tank cars of Imperial asphalt of 71 to 80 penetration were run onto an existing siding alongside the plant and, after heating, the asphalt was pumped to the two 1,000-gallon kettles of the plant by a Kinney steam-jacketed asphalt pump through steam-jacketed lines. From the kettles the asphalt fed by gravity to the pneumatic lift operated by a Westinghouse locomotive-type air compressor.

The operating crew for the plant consisted of one man on the gravel conveyor, one man who attended both the sand and gravel feed, but most of whose attention was directed to the gravel feed in order to slow it down as the 70-ton auxiliary drier could readily overload the 40-ton drier with which the plant was equipped as standard. There were also the fireman and engineer on the steam plant, and the asphalt and stone men at the mixer. The auxiliary drier was equipped with a Waukesha motor and both driers used fuel oil for heating.

Operating 10 hours a day, the plant produced about 600 tons of hot mix in batches of 1,420 pounds of stone and sand and 80 pounds of asphalt. The producing temperature was between 350 and 375 degrees Fahrenheit with a temperature of 280 degrees as applied to the road. Each truck carried about five tons per trip and after weighing was covered with a tarpaulin before it started out to the road.

A fleet of seventeen company-owned Mack trucks was used for the hauling and they were as spotless as though they had been handling clean sand. The drivers were paid a bonus of five cents per hour for exceptionally careful maintenance throughout the season. This meant that the men kept the trucks oiled and greased and the brass name plate of the company well polished as well as cleaning the bodies on the outside and seeing that there were no spots of asphalt on the moss green paint of the bodies and hoods. The bonus was paid for continuous care and not for intermittent care so that if a man failed or became careless during the latter part of the season he lost his earlier bonus money. The bonus was paid in a lump sum at the end of the job.

### GRADING FOR THE PAVEMENT

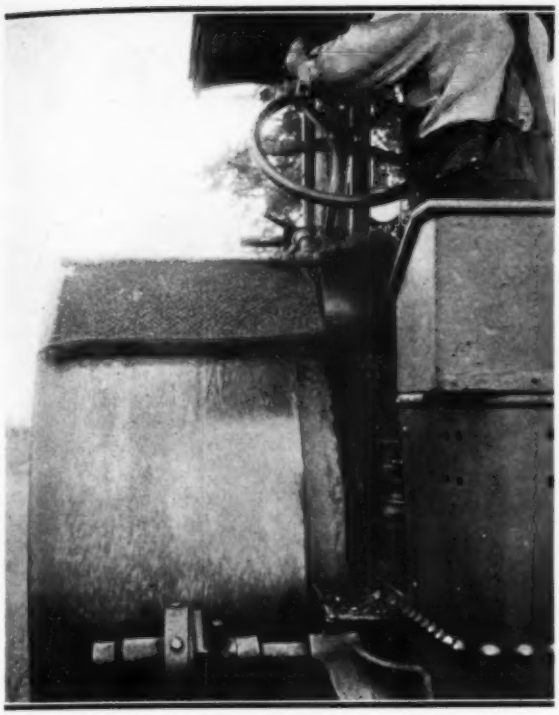
The slight grading for the paving and the actual setting up of the asphalt plant began on May 1, 1931, while paving began on May 15. The whole job was completed about September 7. A Koehring ¾-yard shovel and three trucks handled the shallow cuts and fills on the job while a Cletrac 30 and a Road King grader with a 10-foot blade smoothed off the fills and trimmed up the grade before rolling with a Buffalo-Springfield 15-ton gas roller.

### LAYING THE HOT STUFF

The screeds or forms for the 21-foot bottom course were laid ahead of paving by a crew of three men from the line set by the Department engineers. The forms were 3 x 6-inch pine timber in 12 and 14-foot lengths, and were set 600 to 800 feet ahead of the day's work. When the bottom course was completed the screeds were moved in 6 inches to give a 20-foot width for the top course.

The trucks with the hot mix were turned on the grade about 200 feet ahead of the paving on a Blaw-Knox turntable and then backed to the homemade spreader boxes which were attached to the trucks, the bodies raised to dumping position and the trucks run ahead with the boxes spreading the loose material a little thicker than the required consolidated course. No change in mix was made between the top and bottom courses. The road crew consisted of one man on the

*Spreading the Hot Mix Base Course with Homemade Spreader Boxes*



*Fiber Door Mats Spread the Water on the Rolls*

two spreader boxes which were made in the shops of the contractor, and three rakers and two shovel men. Two Waterous 3-wheel rollers were used on the base and one on the top. The rolls of the Waterous machines were watered to prevent the material sticking. To conserve the amount of water and give a perfectly even distribution over the entire rolls, each of the two rear rolls carried ordinary fiber door mats hung from the water pipes and two mats on the front roll.

As is customary on most of the mixed macadam contracts base course was run in the afternoon and top course in the morning. This minimized the chance for much dirt gathering on the base course before it was covered with top. The final surfacing course was hand cast over the top and consisted of ⅜-inch gravel and sand mixed with 8 per cent asphalt in the plant. The average day's run for the job was about 800 feet of completed road.

### Personnel

Dufferin Paving & Crushed Stone, Ltd., the contractor for this work, is one of the largest organizations engaged in both asphalt and concrete paving in Ontario. W. H. Phillips was Superintendent for Dufferin on this contract. For the Ontario Department of Public Highways the work was under the direction of W. R. Alder, Resident Engineer with a corps of engineer inspectors.

## Building the Boundary Channel Bridge

(*Continued from page 44*)

The reinforcing for the cross diaphragms between the arch beams was set at the same time as the beam reinforcing and run through the beam forms. Keys were placed in the beam forms to permit proper bonding between the cross diaphragms and the arch beams. When the forms for the arch beams were stripped then the cross diaphragm forms were set up between the arch beams and poured.

### Foundation Fill

Immediately after the completion of the pouring of the foundation and the pulling of the steel sheet piling the stabilizing of the foundation was required through the placing of sand and gravel and riprap about the foundation to prevent scour. Just prior to this the piles for the centering of the arch beams were driven but in a few cases the caps were not in place before the barges with the heavier riprap arrived and started placing the stone. A few of the piles were knocked out of line and had to be pulled back into place with the Wiley-Whirleys using a single line run through a block and attached to the next solid bent in the adjacent line. The riprap was brought by barge from the large quarries at Occoquan, Va., about 35 miles downstream from the bridge. There was some riprap brought from the quarries at Chain Bridge, Va., about 5 miles upstream.

### Quantities

| | |
|---|---|
| Excavation | 49,297 cubic yards |
| Foundation fill | 21,500 cubic yards |
| Class A concrete | 4,600 cubic yards |
| Seal concrete | 2,400 cubic yards |
| Reinforcing steel | 724,000 pounds |
| Fabricated steel | 145,000 pounds |
| Dimension masonry | 190 cubic yards |
| Stone masonry | 280 cubic yards |
| Piles | 1,048 |
| Damp-proofing | 5,200 square yards |
| Copper flashing | 2,015 pounds |

### Personnel

The Boundary Channel Bridge is being built for the Mount Vernon Memorial Highway Commission, a Federal unit under the direction of the U. S. Bureau of Public Roads. J. W. Johnson is District Engineer in charge of construction and J. V. McNary, Senior Highway Bridge Engineer. The contractor for this structure and the remaining eleven bridges contemplated in the plan is the Merritt-Chapman & Scott Corp., of New York and Baltimore. This project is under the control of the Baltimore Division, with Frank B. Beasman, Construction Manager, Grover C. Denny, Field Superintendent, and M. A. Warthen, Civil Engineer.

*ECONOMICAL GRADING ON A MINNESOTA PAVING JOB*

*On a paving job near Dodge Center, Minn., the Chas. Weaver Construction Co., Anoka, Minn., encountered difficult grading conditions as the subgrade was on old gravel road. A Trackson tractor-shovel dug and loaded the tough material into trucks at a cost of 10 cents a yard*

# How the Other Fellow Did It

*Construction Briefs*

## Portable Trays Collect Drip from Asphalt Distributors

**108.** To secure a more uniform job in the application of asphalt on bituminous macadam jobs, when the distributor starts the application of the hot asphalt, portable trays with sand spread in the bottom have been used on several Massachusetts projects to catch the first flush of asphalt through the distributor heads as the truck started ahead. This prevents the asphalt being in excess at the points where the trucks started and stopped. The trays are about 10 to 12 feet long, 2 feet wide and have handles at either end so that they may be readily picked up by laborers. 20.1.85

## A Bull-Point Holder Made from Steam Hose

**109.** Holding bull points is a dangerous occupation, but Leroy Phillips of Hutchinson, Kansas, has sent us the accompanying illustration showing a bull-point holder made from a piece of old steam hose that solves the problem and takes the shock out of the blow. A piece of hose from 12 to 20 inches long is cut and a ⅝-inch hole bored through the hose about 2 inches from each end and then a slot about ½-inch long made from each hole toward the center. This permits the bull point to be driven in tight, making a firm, yet shock-absorbing handle. It puts the holder's hands at a safe distance from the sledge. By making a hole at each end, it is possible to double the life of the holder when one end is frayed out. This kind of holder works equally well with a heavy cold chisel for chipping or cutting. L.P.Ks.

*Using the Safety Bull-Point Holder*

## Portable Power Advantageous for Operating Stiffleg Derrick

**110.** The practicability and economy of portable power has been demonstrated many times, but recently an 80-foot extension to a 2-story industrial plant, showed this particularly advantageously. Following the completion of the foundation, the brickwork was started and when this had cleared the ground, the first floor concrete paving was placed, serving as an ideal working platform for steel erection for the second story. A stiffleg derrick was set up on blocks on the center line of the structure and was operated by a small industrial tractor equipped with a double drum hoisting attachment. This rig not only furnished power for the derrick, but moved the derrick itself which was pulled along on its supporting logging by the tractor as the steel erection progressed. The erection crew consisted of four men handling the steel and one man poerating the tractor. 20.2.67

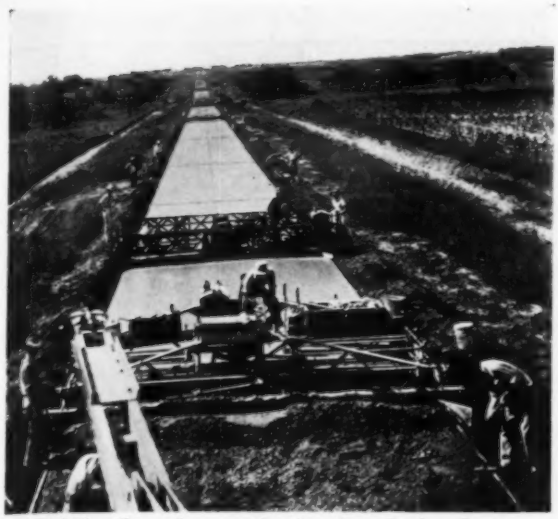
## A Homemade Subgrade Scraper

**111.** A Baltimore contractor was engaged in the widening of an important thoroughfare with strips of concrete about 8 feet wide. To use a commercial subgrade scraper on this odd width job he considered out of the question so he devised a scraper of his own. He used heavy channels slightly less than the 8 feet of the strip in length and placed two of them about 3 feet apart with welded strips to connect them rigidly and with steel plates welded at the ends to carry the planer at just the right height and to make it easy to pull the planer along the steel forms. The planer worked out very successfully throughout the several miles of work on which it was used.

On this same job the fine grade crew, instead of using a scratch board to check the grade at every move as they progressed far ahead of the paver, quickly strung a cord from the form stakes in a zigzag fashion along the section they were grading and then checked the grade from the handles of their shovels which were notched to give the correct depth. This might not prove as helpful in a case where the strip being graded was wider and would permit more men in the area but with a narrow section and one in which the men must of necessity be strung along for some distance and must work fast to keep ahead of the paver, the idea is worth trying out.

## A Novel Idea for Wood Forms for Sand-Asphalt Paving

**112.** On a sand-asphalt job in North Carolina, handled by one of the prominent contractors in this field, the completed asphalt top was to be 5 inches thick. As a means of giving greater stability to the forms and preventing any of the asphalt working out under the forms, the 2 x 8-inch planks were placed 3 inches in the ground and with 5 inches exposed. The planks were not less than 10 feet in length and were purchased by the contractor in random lengths from 10 to 15 feet long. The forms were supported by wooden stakes every 2 feet as specified, but the contractor used more than the required number of stakes to give extra stability to the forms on the super-elevated curves where there was a tendency for the finishing machine to shove the forms on the low side. The stakes were made from 2-foot lengths of 2 x 4's ripped diagonally. The forms and stakes were held firmly together by 40d nails clinched on the outside. 21.1.72



*Finishing Operations on the American Paving Corp. Job in Texas, as Seen from Atop the Paver*

# Installing Center and Transverse Joints on a 22-Mile Texas Concrete Road Project

THE American Paving Corporation of Omaha, Neb., is completing a concrete highway in Texas between Yoakum and Flatonia on Route 109 at the rate of 1,800 linear feet per day. The road is 18 feet wide and has a 9-7-9 inch section. The finishing on this job is being done by a standard Lakewood machine which is followed by a Flex-Plane machine equipped for resurfacing or doing the final finishing as well as installing the longitudinal premoulded ribbon joint which is ½-inch in thickness and 2½ inches in depth. The ribbon is unrolled from rolls of 100-foot lengths progressively from the machine as it moves forward. When this dummy center joint is being installed, the machine is moved forward at the rate of approximately 6 feet per minute and does the final surfacing as well as installing the longitudinal joints.

Transverse contraction joints are also installed by the same machine at intervals of 40 feet. The transverse joint installer is operated by power and about 2 minutes is required to install each transverse contraction joint. One man operates the machine and performs all the various operations.

A longitudinal float bridge is trailed back of the Flex-Plane machine and the surface of the slab is floated with the 10-foot longitudinal float over the installed joints so that the high spots are floated down and any depressions filled.

Because of the intense heat in Texas this summer it was necessary to complete the finishing and install the joints as quickly as possible. Therefore by equipping the joint installing machine with a resurfacing member to follow the standard finishing machine, the work was speeded considerably and it was not necessary for the finishing machine to lap back over the work. Bar mesh reinforcing was used in this construction. The engineer in charge of this work for the Texas Highway Commission was S. C. McCarthy, Division Engineer.

## Running 2,000 Feet of Concrete Slab a Day

(*Continued from page 47*)

asphalt emulsion sprayed on as soon as the hand finishing operations are completed. The State required a return to the older method of curing with burlap and hay for the second half of the work. When the asphalt was used one man was all that was needed to spray the emulsion on the road and then curing proceeded without further attention. When the other method was used two men were required to place the burlap which was immediately wet down. Following them two other men wet down the burlap, replaced it with hay the following day and finally one man was used for sprinkling each 4,000 feet of slab during the curing period of 10 days.

The expansion joints were placed every 78.5 feet using Elastite joint ¾-inch thick.

### A High Average Pour per Day

With the organization described above the contractor was able to maintain an average of 2,000 feet of the 9-foot, 8-7-8-foot section per day throughout the work. The best day's work recorded was 2,355 feet poured in 12 hours. This equalled 490 cubic yards or 476 batches of 1¼-minute mix each.

The pouring of concrete was completed July 3 and the job ready for final estimate just before Labor Day.

### Personnel

Contract 5723 was awarded to Canty, O'Neil & Candell, Inc., Buffalo, N. Y., for whom Casper Candell acted as Superintendent. For the Division of Highways, State Department of Public Works, the work was in charge of H. E. Smith, District Engineer, with R. C. Henderson, Assistant Engineer in residence.

*A Fleet of 25 Dodge Trucks Recently Delivered to the Kentucky State Highway Commission Equipped with Wood 1½-Yard Hydraulic Hoist Bodies*

*The Construction Yard, Storage Space and Crusher Plant*

# Safe Harbor—

## *The Organization and Equipment That Speeds the Construction and Installation of the Initial 255,000 Horsepower*

SPANNING the Susquehanna River, 10 miles below Columbia, Pa., the Safe Harbor water power project is now rapidly nearing completion. The primary power installation will consist of six generating units of 42,500 horsepower each, totaling 255,000 horsepower, which will eventually be doubled by the addition of six more units. The average head developed by the present dam is 53 feet which will be increased later to 55 feet. The design of the plant, both electrical and structural, is in accordance with the most advanced technical knowledge of the day.

### Quantities

Following are the quantities involved in the construction of the dam and powerhouse exclusive of the machinery:

| | | |
|---|---|---|
| Excavation—Dam | Earth | 81,000 cubic yards |
| | Rock | 85,000 cubic yards |
| Powerhouse | Rock | 142,000 cubic yards |
| Tailrace | Rock | 162,000 cubic yards |
| Railroad relocation | Rock | 249,000 cubic yards |
| Borrow for embankment | Rock | 365,000 cubic yards |
| Quarry—Stripping | Earth | 75,000 cubic yards |
| Trap rock | Rock | 285,000 cubic yards |
| Limestone | | 98,500 cubic yards |
| Miscellaneous excavation | | 84,500 cubic yards |
| Total excavation | | 1,628,000 cubic yards |
| Concrete—Dam and Operating Bridge | | 285,000 cubic yards |
| Powerhouse | | 156,000 cubic yards |
| Skimmer wall | | 9,000 cubic yards |
| Miscellaneous concrete | | 10,000 cubic yards |
| Total concrete | | 460,000 cubic yards |
| Miscellaneous Items—Structural steel | | 11,500 tons |
| Gates and guides | | 6,500 tons |
| Reinforcing steel | | 5,500 tons |

## *The Arundel Corporation, Baltimore, Md., Has Made Use of Every Natural Resource to Minimize Costs and Hasten Completion*

### General Description of the Plant

The following descriptive text is based on a paper presented by C. W. Black, Chief Engineer, The Arundel Corp., before the engineering societies of Baltimore, while the text on organization and equipment is based on first hand inspection of the work by the Editor of CONTRACTORS AND ENGINEERS MONTHLY.

The powerhouse, forebay and tailrace are located on the easterly or Lancaster County side of the Susquehanna River. The powerhouse, which forms a part of the dam, will ultimately have a length of 920 feet. The substructure and superstructure are now being built for seven main units and two 3,100-horsepower station service units, forming a completed structure 610 feet long, although only six main units will be installed in the initial project. Intakes for five future units are being constructed now, and provisions are being made in the present construction so that the draft tubes for these units may be constructed with a small expenditure at a later date. The main turbines will be of the Kaplan type designed for a normal head of 55 feet and 109 rpm, driving 3-phase, 60-cycle, 13,800-volt generators. The generator voltage will be stepped up by transformers to 220,000 volts for transmission to Baltimore and to 66,000 volts for feeding into the present system of the Pennsylvania Water & Power Co. The intake for each main unit is provided with one roller gate operated by a stationary hoist and two sliding gates which will be lifted by a gantry crane. The powerhouse and tailrace excavation are carried to a depth of 44 feet below the river bed or approximately 100 feet below the reservoir surface.

A skimmer wall of structural steel and concrete, parallel to the river, and 1,500 feet long will keep ice and floating débris out of the forebay. A rock dike forms a closure between the upstream end of this wall and the shore.

*The 4-Cubic Yard Electric Shovel and Several Well Drills at Work in the Quarry*

*PREPARING THE AGGREGATES FOR THE SAFE HARBOR DAM*

*1. Some idea of the size of the Marion 4-yard electric shovel may be derived from this photograph showing a man standing by the crawlers. 2. The 4-yard shovel cleaning up a recent blast. 3. Loading one of the fleet of Diamond-T trucks equipped with Easton dump bodies. 4. The track bins of crushed stone with the conveyors to the left to the storage piles*

The dam, a gravity-section concrete structure, will have thirty-two spillway gates, eight in the east channel, adjacent to the powerhouse, and twenty-four in the west channel. Each spillway gate when raised will give a clear waterway 48 feet wide by 30 feet deep at initial pool level, and will discharge 30,000 cfs. Four of the gates in the east spillway will be double leaf regulating gates, with the upper leaves lowered by means of stationary hoists, to obtain close regulation of the pool level. The remaining twenty-eight flood gates, which are of the Stoney type, will be handled by two 150-ton traveling gantry cranes. The two spillways have a total length of 1,810 feet. Between the two and also abutting both shores are non-overflow sections of the dam with a total length of approximately 2,250 feet. In general the gantry rail on the dam operating bridge will be about 75 feet above the rock surface in the river.

### LIMESTONE AND TRAP QUARRY DEVELOPED

A narrow dike of unusually hard trap rock was found close by in a limestone formation and was developed to furnish limestone for railroad ballast and rock borrow and trap for concrete. The trap dike is 75 feet wide and dips at an angle of 70 degrees. The trap has a density of 2.99 and weighs about 187 pounds per cubic foot solid.

A group of seven electrically-operated Sanderson-Cyclone well drills put down 8-inch holes to depths varying from 90 to 100 feet. One 6-inch well drill, gas engine-operated, supplemented the group of electric drills. The production of rock was about 12 yards per foot of hole drilled, with charges averaging 1,500 pounds of du Pont 40 per cent glycerine dynamite per hole. Some block-holing was necessary in the limestone for which Ingersoll-Rand jackhammers were used. Air for the drilling was furnished by six Ingersoll-Rand Imperial type compressors located on the south bank of Conestoga Creek about 1,000 feet from the river. These compressors with a capacity of 4,860 cubic feet of free air per minute at 100 pounds pressure supplied air to all parts of the work through 12, 8 and 4-inch mains. Part of this compressor equipment is to be used in the completed plant.

The drillers worked in two 10-hour shifts on either trap or limestone, usually running seven days a week. A 4-yard Marion electric shovel handled the stone at the quarry loading a fleet of five Diamond-T 5-yard, 6-wheel trucks which hauled an average of 2,400 tons per 10-hour shift, a distance of about one-quarter mile to the primary crusher.

The biggest day's production for the quarry was 3,000 tons of crushed stone. The quarry shot of May 10 produced 33,000 tons of rock, while the largest blast produced about 170,000 tons of rock. The explosives magazine measuring 20 x 15 feet is located about one-quarter mile up a ravine away from the quarry.

### CONSTRUCTION POWER

Power used on the work was largely electric, supplied

by the Holtwood plant of the Pennsylvania Water & Power Co. located 8 miles downstream. The 3-phase, 60-cycle, 35-kv transmission line was run on temporary poles set up on the Pennsylvania Railroad right of way.

### THE CRUSHING PLANT

The trucks with rock from the quarry back into the primary crusher house and dump directly into a metal-lined pit measuring 9 x 7 feet to a 56 x 72-inch Buchanan jaw crusher. This unusually large size crusher was chosen to minimize the need for secondary blasting in the quarry. A Clyde single-drum electric hoist was installed back of the pit to operate a large stone hook to move large blocks of rock which might become wedged in the crusher. When this failed mud capping was resorted to. The primary crusher is operated by a 250-horsepower Allis-Chalmers motor with a multiple-V belt drive.

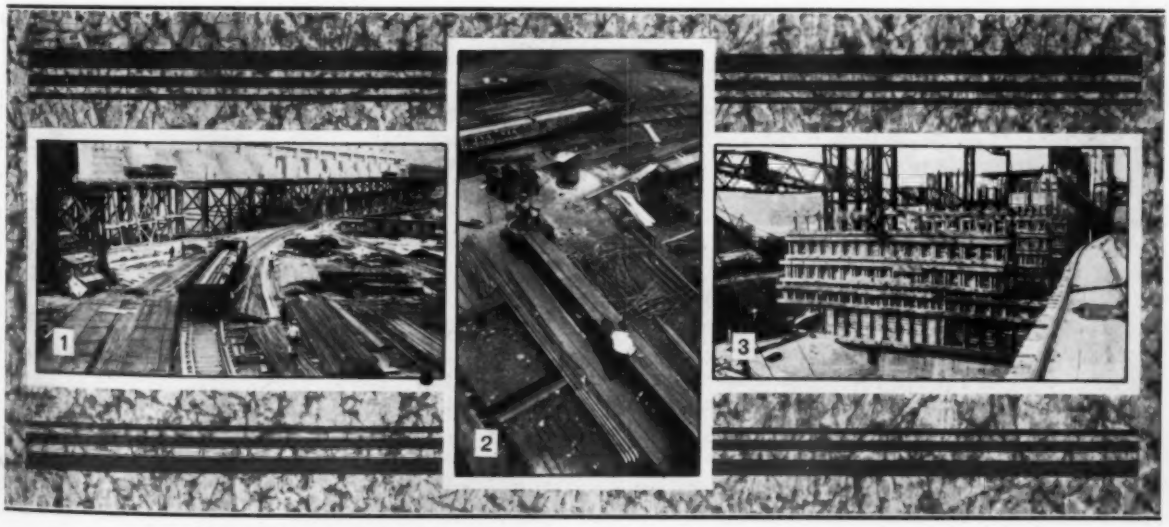
From the primary crusher the stone runs over an inclined rail grizzly to a double pit in which two Telsmith 20-inch gyratory crushers are located. The primary stone runs about 9 inches in diameter and the stone from the secondary crushers about 4-inch ring size. The stone from the secondaries runs to a 200-foot x 36-inch belt conveyor which delivers the material to the Robins vibrating scalping screens with 4-inch square openings. The oversize from these screens goes to two 10-inch Telsmith gyratory finishing crushers. From these another Robins 200-foot x 36-inch conveyor belt takes the stone to the screen house where dirt and dust are removed and the material screened into coarse aggregate, from 1½ to 4-inch, and fine aggregate, 1½-inch and smaller. The dirt and dust are carried on a separate belt to the spoil bin from which the material is removed by railroad cars for ballasting temporary track and for construction roads. The storage bins are of all-metal construction. The various sizes of aggregates can be loaded into railroad cars direct from the bins. The excess material is carried to storage by two conveyors, one for each size of stone and thence by lateral conveyors with automatic tripping devices to the stockpiles beneath trestles where about 25,000 tons of stone are maintained against any breakdown in the production facilities.

*Construction of the First Lower Cofferdam Between the East Shore and Else Island*

Material as needed is loaded into standard gage hopper-bottom railroad cars either from the storage bins or by an Industrial-Brownhoist or an American steam locomotive crane from the stockpiles.

### HANDLING OF FINE AGGREGATE

Sand for the large volume of concrete is received in hopper-bottom cars from the headwaters of the Chesapeake Bay at Northeast, Md., where the Arundel Corp. has a large dredging plant. The sand is hauled by rail, as required, a distance of about 50 miles. The sand cars are run out over the long trestle to Else Island where the sand is dumped directly into the sand storage bins at the central mixing plant. Storage is provided at the dam site by dumping cars from three storage trestles, located near the compressor plant on Conestoga Creek. Sand from storage is rehandled by the locomotive cranes as needed at the concrete plant. The sand




*HANDLING REINFORCING STEEL AND A TYPICAL SECTION OF FORMS*

*1. Unloading reinforcing steel in the island yard by hand. 2. A power bending machine on which all of the various shapes of reinforcing were bent. 3. A typical section of form-work on the piers, showing the excellence of form construction and the strengthening of the individual panels by carrying the vertical members through two vertical sections*

*One of the Gantries Showing the Boom and Concreting Tower*

storage was about 40,000 tons maximum and was maintained at this amount during the fall and winter because of possible interruption to production during the winter, while concrete work went on continuously with the necessary precautions.

### The Central Concrete Mixing Plant

The sand and two sizes of stone are delivered by the hopper-bottom cars to the ground storage bin on Else Island into three separate compartments. Each section has six gates in the hopper bottom through which any one of the aggregates can be delivered to the two 36-inch primary belts to the delivery belt, also 36 inches wide which carries the material 300 feet to the top of the batcher plant bins. From there a distributing conveyor carries the aggregate to the three parallel storage bins, the sand bin on the left, the ¾ to 1½-inch stone in the center and the 1½ to 4-inch stone on the right. A trip with two delivery chutes on either side delivers the material to the proper bin.

Cement is furnished in bulk by a syndicate headed by Lehigh and is received over the trestle and unloaded by hand, 4 men to a car, shoveling to hoppers at the doors of the cars equipped with coarse screens to catch extraneous matter. Two cars of cement are unloaded at one time and in this manner as many as fourteen carloads of cement have been unloaded per day.

The cement as shoveled out from the cars drops to a screw conveyor which delivers it to an enclosed bucket conveyor which carries it to a second screw conveyor at the top of the two silos, each of which has a capacity of seven carloads. The cement is inspected and tested at the plant of the producer by representatives of the testing laboratories of E. L. Conwell & Co. of Philadelphia, Pa.

Reinforcing steel is received by carload lots and delivered by the lower trestle direct to the ground level of Else Island, where it is unloaded by hand and then bent as required by a power bending machine.

### Types of Concrete Produced

A complete concrete testing laboratory is maintained by the owner and the correct proportions of materials established and maintained through constant tests of aggregates and the completed concrete. Specimens are also regularly tested at the laboratory of the inspection engineers in Philadelphia.

Concrete is divided into three classes, A, B, and C, according to the use to be made of it. Class A concrete with a maximum of 1½-inch stone is used for small pours where there is heavy reinforcing. The proportions are 1½-inch stone, 3,820 pounds; sand, 2,700 pounds; and cement 1,250 pounds. The sand normally contains 12 gallons of water so 70 gallons of water is added for the 2-yard batch.

Class B concrete is used for the power house construction and contains stone from 4-inch down to ⅜-inch. The proportions are 3,900 pounds of stone from 1½ to 4-inch, 850 pounds of stone from ⅜ to 1½-inch, 2,680 pounds of sand and 1,170 pounds of cement. The sand

*Pouring Concrete Into Forms from One of the Gantries*

*View from the Observation Site Showing the Progress of Work to April 30, 1931*

normally contains 12 gallons of water so 58 gallons of water are added for the 2-yard batches.

Class C concrete is used for the bulkhead and spillway and all outside mass concrete. The stone is the same as used in Class B concrete but the mixture is leaner. The proportions are 3,670 pounds of stone from 1½ to 4-inch, 910 pounds of stone from ⅜ to 1½-inch, 2,790 pounds of sand, and 940 pounds of cement. The sand normally contains about 12.5 gallons of water and 53 gallons are added for the 2-yard batches.

### Weighing the Batches

A complete system of colored light signals was established throughout the plant to enable the operators in the various sections to know just what is expected. From the top of the plant colored lights are switched on to indicate at the ground hopper just what kind of aggregate is running low and should be sent up the conveyor. This is necessary as there is only one delivery belt from the ground storage to the top of the batcher bins. Throughout the concrete plant a system of lights indicates just what kind of concrete is to be mixed in the particular mixer, four of which were installed with a complete set of Blaw-Knox weighing batchers for each.

Sand and stone of the proper sizes are delivered to the weighing batchers by gravity by opening the proper gates. Supplementing the usual scale beam the contractor installed a Howe Weightograph showing cumulative weight on an illuminated screen, which worked out very satisfactorily. The cement is delivered by a screw conveyor to a separate weighing hopper and then all three aggregates and the cement are dumped at one time into the skip of the Ransome 2-yard drum-type mixer. Water is measured by a tank carefully calibrated and equipped with a wheel at the top which indicates the amount of water which will be delivered from the full tank when the reading is properly set. This is done by a siphon, the siphon being broken by a spiral slotted pipe which is lowered or raised by the wheel to give the amount of water desired.

Water for the concrete and for other purposes about the construction camp is supplied by a centrifugal pump direct from the Susquehanna River to a storage tank on the hill back of the Administration Building. Water for flushing and for the concrete is used raw, but water for all other purposes is filtered and chlorinated by a Wallace & Tiernan machine.

### Transporting and Placing Concrete

After the concrete is mixed 1½ minutes in the Ransome 2-yard machines it is discharged into 2-yard side-discharge concrete hoppers mounted four to a regular railroad flat car. These cars are hauled over the construction bridge by 10-ton Plymouth gasoline locomo-

tives. The flat cars are counterbalanced with concrete slabs as the hoppers are set well to one side of the center of the flats.

The concrete plant is located adjacent to the steel construction bridge which runs the entire length of the powerhouse and dam. It is built of rolled structural shapes with field-bolted connections, so as to have a high salvage value. The construction bridge which is located on the downstream side of the dam carries three standard gage railroad tracks and the four 40-foot span gantries which travel the entire bridge. Each steel gantry is mounted on four 3-wheel trucks and carries a steel concreting tower 100 feet high from which concrete is chuted to the forms as far as 250 feet from the tower. Three gantries carry an 85-foot boom stiffleg derrick, and the fourth carries a 100-foot boom with a capacity of 35 tons at 50-foot radius for setting the heavy powerhouse machinery.

The daily production of the concrete plant in the one shift has been as high as 2,700 yards on monolithic work. The type of work under way, however, is such that large pours are rare because of the carefully constructed intricate formwork. Concrete pouring was started on August 1, 1930, and up to June 1, 1931, a total of 334,000 cubic yards was poured or an average of 33,400 cubic yards per month. The maximum month's pour was in February, 1931, amounting to 45,000 cubic yards, most of which went into the powerhouse structure.

### Winter Concreting Precautions

Concreting was carried on as required throughout the winter of 1930-1931. Four 100-horsepower Farquhar locomotive-type steam boilers were set up to supply steam for a grid of steam pipes in the ground hoppers on Else Island and the water for the mixers was heated by perforated pipes. The average temperature of the concrete as placed in the forms was from 60 to 85 degrees Fahrenheit. Immediately after pouring was completed the forms were covered with tarpaulin and heated with steam pipes.

### Preliminary Excavation and Clean-up of the Tailrace

The excavation for the dam was started in June, 1930, after the cofferdams had been completed to enclose this area. The dam excavation was loosened by light shots and loaded by hand into skips and hauled out in side dump cars, as the preparation of the dam foundation was essentially a matter of removing disintegrated rock on the surface and following down seams. The deep excavation for the powerhouse and tailrace was drilled and blasted and removed by shovels. Special I-R X71 drifters for running holes up to 30 feet deep at the rate of 100 feet per shift were used. These drifters are equipped with an air hoist to handle the long steel instead of the familiar tripod mounting.

The powerhouse and tailrace excavation and practically all the dam excavation was completed by the end of December, 1930, within the first cofferdam. Up to April 1, 1931, one year after the cofferdam was started, a total of 1,124,000 cubic yards of material, mostly rock, had been removed.

### The Construction Camp

The construction camp, located on the north bank of Conestoga Creek, has bunkhouses to accommodate 700 men and which are equipped with hot and cold showers and sanitary plumbing. There are two dormitory buildings with 34 single rooms each to house the office men, engineers and general foremen. Ten 4-room cottages are also used by some of the staff and several existing houses in the vicinity were remodelled for the staff. The main dining hall seats 600 men and a staff dining room has a capacity of 110 men. There are also a commissary store, hospital, laundry, fumigating house and jail. The maximum force to June 1, 1931, was 2,700 men which will be increased shortly because of the number required for the installation of the powerhouse equipment.

### Personnel

The Safe Harbor development is owned by the Safe Harbor Water Power Corp., which was formed by the Consolidated Gas, Electric Light & Power Co. of Baltimore and the Pennsylvania Water & Power Co. of Holtwood, Pa. All the engineering has been done by the owner companies under the direction of N. B. Higgins, Assistant Chief Engineer. H. E. Whitney, Construction Engineer, is in charge of the company's force at Safe Harbor.

Until his sudden death on April 6, 1931, George Angell had been in charge of the forces at Safe Harbor for the Arundel Corp. of Baltimore, contractors. Mr. Angell had also been superintendent for the Arundel Corp. on the construction of the Conowingo Dam from 1926 to 1928 and had been connected in a supervisory capacity with the building of a number of hydro-electric projects in the United States and Canada, among them the Holtwood Plant of the Pennsylvania Water & Power Co., located 8 miles below Safe Harbor and which started operation in 1910. A. T. Cassell is now Works Manager for the Arundel Corp. at Safe Harbor, with H. C. Anderson as Superintendent.

## The Florence Nightingale Institute of Honorables to Award Six Annual Honorary Fellowships

BECAUSE of the importance and magnitude of the Hoover Dam construction the public is interested in anything which has to do with the conduct of the work. The Federal Government is morally responsible for what happens on the job even though the work is under contract with the Six Companies, Inc.

Next to material and labor, the most important item is that of providing safe and sanitary working places. Effective supervision is absolutely necessary and the employees look to the Federal Government for this supervision. Without the help of the men in direct charge of work, however, little can be accomplished. Some way must be found for arousing a real interest among foremen and superintendents.

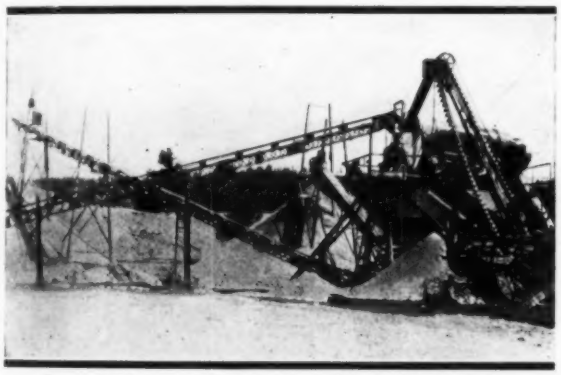
In an effort to bring about action, the Florence Nightingale Institute of Honorables has decided to award not less than six annual Honorary Fellowships to those men in direct charge of construction work who on their records have done the most to live up to the slogan "Hoover Dam Construction Without a Fatal Accident." As evidence of the awards, engraved certificates in gilt frames will be presented to the winners. They will be designated as "The Edward G. Sheibley Awards for the Conservation of Human Life."

# Concrete Aggregate Produced from Local Material

IN the Adirondack Mountains, near Schroon Lake, N. Y., a modern portable screening, crushing and washing plant has been producing in one shift sufficient concrete aggregate to run two 27-E pavers. The job was a 20-mile concrete paving project, completed this fall. Because of the long mountainous haul from the nearest shipping point, it was impractical to consider shipping in the aggregate for the concrete. Consequently the contractor for the project sublet the production of the aggregate to McKinney Brothers, whose job is was to furnish sufficient aggregate for two 27-E pavers and meet the standard requirements of the New York State Highway Department which call for the fracture of 90 per cent of all the particles of rock in the coarse aggregate.

Test pits indicated a large supply of gravel on the banks of a clear mountain stream, and therefore good water was available nearby. Here a Pioneer portable screening, crushing and washing plant was set up. The pit contained an overabundant supply of small round rock that would pass the 2¼-inch ring, creating the problem of catching the pebbles that would pass the maximum screen specifications and fracturing 90 per cent of them before they were delivered into the stockpile, and still produce approximately 80 yards of rock aggregate per hour.

One steam shovel and several large trucks were used to bring the material to the hopper of the feeder conveyor of the



*General View of the Pioneer Plant Operated by McKinney Bros., at Schroon Lake, N. Y.*

intermediate crushing plant, which was set directly over the feed conveyor of the main crushing and washing unit. The pit-run material was carried up the 24-inch belt conveyor to the intermediate plant, which consists of a shaker screen, a 14 x 24-inch roll crusher and an 836 jaw crusher. The sand fell through the sand screen of the shaker onto the feeder conveyor of the main unit. The smaller pebbles retained on the ¾-inch screen and passing a 1¼-inch ring were fed into a roller crusher, and thence onto the same feeder conveyor with the sand. The material which was retained on the 1¼-inch screen and which passed a 2¼-inch ring was carried over to the jaw crusher and thence to the main unit.

The feeder conveyor of the main plant took the fractured particles together with the sand and the oversize material, and delivered them into a 42-inch diameter 16-foot long revolving screen. The first 4 feet of this revolving screen is the scrubber section. As the material was fed into this scrubber, it was met with a 3-inch jet of water and thoroughly churned. The balance of the revolving screen has a 2¼-inch round perforation and acts as a scalping screen. The oversize material passed through the end of the cylinder of this screen and was delivered into the jaw crusher, and then back to the revolving screen by means of a bucket elevator. The material passing through the perforations of the revolving screen fell onto an SKF bearing

*Close-up of the Feeder Belt*

equipped shaker screen 16 feet long which classified the material. The lower deck of this screen was used to separate the sand which fell into a settling tank and thence up the sand delivery conveyor to the stockpile. The top deck of the screen separated the No. 2 and No. 3 stone, which was delivered to separate stockpiles by means of belt conveyors.

A clamshell dragline was so located that it could easily load from each stockpile the sand and coarse aggregate into the batcher bin, whence it was hauled to the pavers. Provision was made for the 12-hour storage of sand before placing it in the batchers, as required by the State Highway Department.

Including the sand, 120 yards an hour of acceptable material was produced. In order to produce the amount of material necessary, the contractor was prepared to operate day and night shifts until it was found that the plant had sufficient capacity to feed the two pavers with only one shift.

## Digging a Pipe Line Across the Rockies

S. BIRCH & SONS CONSTRUCTION CO., of Great Falls, Mont., recently completed 25 miles of pipe trench across the Rocky Mountains in 531 actual working hours. The trench was 115,360 feet long so that the equivalent of 217.5 feet of trench was dug per working hour. The ditch, which was dug with a Parsons Model 35 pipe line special, averaged between 5 and 6 feet deep and 32 inches wide. A great deal of rock was encountered which had to be shot with dynamite before the machine could handle it.

This pipe line, which was constructed for the Montana Power Co., passed over the Northern Pacific Tunnel which goes through the Transcontinental Divide at Bozeman, Mont. The rail level is 6,328 feet above the sea at that point and the trench was approximately 1,500 feet above the tunnel, so that the ditcher was working close to 8,000 feet above sea level. A great many of the hills presented grades up to 30 per cent for the ditcher to climb.

*A Parsons Trencher Working in the Rockies*

# Legal Points for Contractors

***These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney***

**Edited by A. L. H. Street, Attorney-at-Law**

## A Vital Phase of Public Construction Contracts

There is a great need—experience amply shows it—for contractors to get the habit of treating the taking of certain classes of contracts as being analogous to the taking of title to, or a mortgage on, a piece of real estate. The contractor who blindly assumes that the other party to the contract is creating an enforceable money obligation to him might be talked into buying Grant's Tomb or the Statue of Liberty from some stranger.

The need for caution is great when a contract is being taken from public authorities. This is illustrated by the decision recently announced by the Massachusetts Supreme Judicial Court in the case of Dyey v. the City of Boston, 172 N. E. 235.

It appears that in Boston, as in many other cities, there is in force a statute forbidding the contracting for expenditures in excess of available appropriations. And the court said concerning a contract for construction of a boiler plant:

"The officials of Boston had no authority to contract for any expenditures in excess of the appropriation even though such expenditure might be found to be reasonably necessary in building the structure for which the money was appropriated. *Contracts made for an expenditure in excess of the appropriation cannot bind the municipality* . . . The contractor was bound to take notice of this limitation of authority and to make his contracts with reference thereto . . . The acceptance and use of the building by the city do not bind it to pay for extra or unauthorized work done upon it."

## Subs Had to Account for Preferential Payments Made by Insolvent Contractor

In administering the Bankruptcy Law, as well as in playing poker, bridge, etc., it has been found necessary to taboo dealing from the bottom of the deck and other such acts as tend to give some of the "players" an undue advantage that others do not get.

As the bankruptcy practice grew, it became manifest that the law would be a dead letter if something were not done to head off preference of creditors on the verge of bankruptcy through the debtor paying some of them up in full and leaving the rest to "whistle." So it was enacted that one who receives a payment from a debtor within four months of the latter's adjudication as a bankrupt, with knowledge of the debtor's insolvency, may be required to refund the preferential payment to the trustee in bankruptcy.

In the case of Ehrlich v. Johnson Service Co., 172 N. E. 508, the Massachusetts Supreme Judicial Court decided that a railroad company's payment to subcontractors of money due a general contractor constituted an illegal preference of the subcontractors, as creditors of the general contractor. Disposing of the case, the court said, in part:

"There is no promise made by either the railroad or the company [the general contractor] to pay the defendants [subcontractors] out of any particular fund. The most that can be said is that under paragraph twenty of the contract the railroad has authority to make such payment under certain conditions, but it is not bound to do so. Consequently it does not appear that the defendants had even an enforceable contract right. . . .

"The defendants received the payments within four months of the adjudication in bankruptcy, after they had notice of the insolvency of the company. Although the payments were not made directly by the company but were made by the railroad, the latter was the company's agent under paragraph twenty of the contract between the company and the railroad. The defendants . . . . received notice of the assignment for the benefit of creditors and thereby had reasonable cause to believe that the bankrupt was insolvent. As unsecured creditors the defendants, by receiving the payments from the railroad, secured a greater percentage of their claims than the other unsecured creditors, and thereby received a preference voidable by the trustee under section 60a and 60b of the Bankruptcy Act."

## Altering a Check's Date Very Expensive

When a debtor gives you a postdated check to settle what he owes, you may become tempted to change the date to today and put the check through the bank. But don't yield to the temptation lest you find yourself in the box in which a creditor placed himself, as shown by a recent decision of the South Carolina Supreme Court (153 S. E. 473). It cost the creditor $2,000, plus court costs, etc., because the due date of a $55 check was unauthorizedly advanced from September 1 to August 1. The debtor convinced two courts and a jury that his credit was impaired by this wrongful act on the part of the creditor, and a damage judgment resulted.

Another possible consequence of altering a check or other document is a prosecution for forgery, although it does not appear that criminal proceedings were had in the above case.

In passing, it is also interesting to note that the courts hold that a fraudulent alteration of a document defeats the right of the wrongdoer to enforce the instrument against the other party either in its altered or original form. So, in the South Carolina case, the debtor could have successfully defended suit upon the altered check.

## When Bond or Lien Does Not Cover Temporary Materials

A contractor's bond to pay for materials used in the construction of a bridge on a public highway did not cover lumber used in making concrete forms, according to the decision of the Ohio Court of Appeals for Scioto County in the case of Indemnity Insurance Co. of North America v. Portsmouth Ice, Coal & Building Material Co., 172 N. E. 566. The court said, in part:

"The rule in this state is that recovery upon a bond of this kind for material furnished can only be had where the material either enters into and forms a part of the finished structure, or at least is capable of being so used. . . .

"The agreed statement of facts . . . show that the material furnished by that company to the contractor did not enter into the completed bridge, and could not have done so; that, after the bridge had been completed, it was to be removed from the site and was still of some value to its owner."

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News of Consultants
in the
Civil Engineering Field

The Consulting Engineer

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# The Lorain-Central Bridge

## Over the Cuyahoga Valley,

## Cleveland, Ohio

*Office of*

*Wilbur Watson*

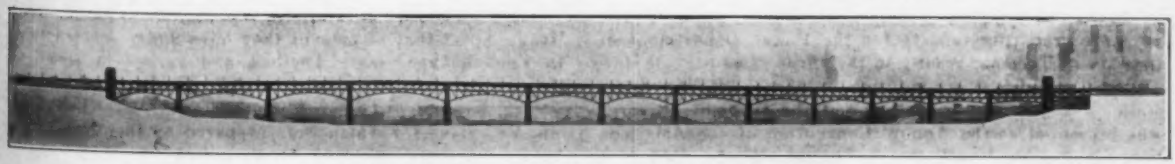
*and Associates*

THE project of constructing a high level bridge over the Cuyahoga Valley, connecting Lorain Avenue on the west side of Cleveland, Ohio, with the east side of the city, has been discussed for many years. Much of this discussion hinged on the proper location of the eastern approaches. About 25 years ago, Wilbur Watson, Consulting Engineer, Cleveland, made some studies for a viaduct from Lorain Avenue direct to the southwest corner of the Public Square but the plan did not meet with approval. Since that time many studies were made and in 1927 a Citizens Fact Finding Committee was organized at the suggestion of the Chamber of Commerce and other civic bodies. This Committee made an exhaustive study of the factors involved and finally recommended locating the eastern terminus at Central Avenue, building a single deck at present and making provision for a future lower deck to carry street cars and trucks; and providing for proper and adequate separation of traffic between the proposed new bridge and the existing Central Viaduct. The recommendations of the Committee also provided that the main approach to the bridge should be at the level of Ontario Street.

The location of the piers was dictated largely by the consideration of property damages. Starting at the east bank of the valley, the structure passes over the tracks of the Wheeling & Lake Erie Railroad, then over Canal Road, an important street, then over the tracks of the B. & O. Railroad and thence over numerous yard tracks of the Big Four Railroad to the River. On the west side of the river lie the tracks of the Erie Railroad, then the Big Four main line and the Erie dock tracks. The problem of so locating piers as to damage these yard facilities as little as possible, not to interfere with city streets, and to cause a minimum of disturbance to industrial plants, was a complicated one. It was also required that the structure be so designed as not to interfere with the carrying out of the so-called Number 2 cut of the river-straightening program of the city. This proposed cut lies west of the west pylon of the bridge, and the problem was solved by designing this part of the structure in such a manner that trusses can be inserted under the floor system of the bridge, the posts removed, and the excavation for the cut carried out without interruption of traffic over the bridge. The Citizens Committee was desirous that this bridge should have architectural character as well as exemplify good engineering practice and WILBUR WATSON & ASSOCIATES, the designing and consulting engineers for the project, have had the assistance and advice of F. R. Walker, of Walker & Weeks, architects, in determining the general design and the detail design of the railings and pylons.

Starting with the east end, the first span of the bridge is a simple truss span, the next is fixed and the

(*Continued on page 73*)



*The Lorain-Central Bridge Now Under Construction*

# The Consulting Engineer

*A Section of*

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## Boston Consulting Engineers Consolidate

ACCORDING to a recent announcement, the consulting engineering offices of SYMONDS & STEVENS have been consolidated with X. Henry Goodnough, Inc. This combined organization will specialize in water supply, drainage, sewerage, sewage disposal, river improvement and disposal of municipal and industrial wastes. The members of the organization are X. Henry Goodnough, Fred O. Stevens and Bayard F. Snow.

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**Tiffany & Langloe**, Security Bldg., Olympia, Wash., are now preparing reports for the Power Department of the City of Tacoma, Wash., on the effect of additional storage on ground water conditions in the lower Skokomish Valley. A paper, "Irrigation and the Columbia River," was presented at the Annual Convention of the American Society of Civil Engineers at Tacoma, Wash., July 8, 9, and 10, 1931.

# Consulting Briefs

**Weston & Sampson**, 14 Beacon St., Boston, Mass., are building reservoirs for Keene and Wilton, N. H., and a pumping station and well system for Reading, Mass. They have prepared plans for an extension of the standpipe and for a new softening unit at South Orange, N. J., and for a new tower tank and extensions to the distribution system at Westerly, R. I. They are also making studies for the City of Newark, N. J., the Philadelphia Suburban Water Co., and are planning and supervising several small sewage and waste treatment works. In general, they report an unusually busy season.

**Baker, Vogel & Roush**, Smith Tower, Seattle, Wash., have recently been called as expert witnesses in litigation on the arbitration on architects' fees. Under their supervision a high school at Issaquah, Wash., and the Franklin Building at Kirkland, Wash., are being constructed.

**George C. Stone**, Masonic Temple, Danville, Va., reports that he is now working on a report showing the ownership of various parcels of real estate involved in the site for the new Post Office at Danville, Va. Recently he was called as an expert witness in the case of the Lima Wood & Coal Co., Inc., vs. the Southern Railway Co., in the Danville, Va., Corporation Court.

**Fuller & McClintock**, 170 Broadway, New York, have completed the $2,000,000 design for the Memphis water project. This project will include well supply works, pumping station, storage basins and treatment works for iron removal. Bids on the general contracts and machinery were received in August. In conjunction with H. P. Jones & Co., Second National Bank Bldg., Toledo, Ohio, they are designing a 16,000-foot pressure water conduit for the City of Toledo. The contract is expected to be let in September.

**Russell Thayer**, Packard Bldg., Philadelphia, Pa., reports that he is now working on detailed plans for construction for the New Jersey Sea Level Ship Canal Co.

**Glazier & Morlidge**, 403 Broeman Bldg., Cincinnati, Ohio, report that they have recently completed plans for a water works system, a water softening plant and increase in distributing system and reservoir for the city of Ludlow, Ky., at an estimated cost of $100,000. Under their supervision a sanitary sewer system and disposal plant are being installed at Fort Mitchell, Ky.

**Ernest B. Hussey**, 1311 Alaska Bldg., Seattle, Wash., reports that he has been called as consulting engineer for the joint commission on inter-county river improvement of King and Pierce Counties, Washington. Extensive construction work has been and is now in progress for river control and permanent bank and levee protection of the White, Stuck and Puyallup Rivers. These rivers are very erratic in their course subjecting the lands surrounding them to great damage.

**Henry F. Bryant & Son**, 334 Washington St., Brookline, Mass., report that at present they have under construction an English type single dwelling and garage in Newton, Mass., as well as the grading, water supply, drainage and sewage disposal project for Bennington College, Bennington, Vt., plans for which were prepared by this firm. Under their supervision sewer drains and roads are being constructed on the Sargent Estate, Brookline, Mass.

## The Lorain-Central Bridge Over the Cuyahoga Valley, Cleveland, Ohio

*(Continued from page 71)*

alternate spans from then on have suspended trusses, the longest being over the river, comprising six panels of the twelve. The superstructure of all spans between the pylons is carried on steel trusses of the cantilever type, alternate spans carrying suspended trusses. These cantilever trusses differ from the usual design of such trusses in that the lower chords are curved to give a more pleasing appearance to the structure. The architectural treatment consists essentially of the adoption of the curved lower chords of the trusses, carrying the piers up to the roadway by means of a concrete facia wall and concrete pedestals between the trusses, the stone and aluminum railings, and the four massive stone pylons, decorated with heroic size carved figures. The use of aluminum panels for the bridge railing, suggested by the architect, is a new departure.

The foundations for the river piers are a concrete mat, 33 feet 6 inches by 100 feet in size, 7 feet thick and heavily reinforced, carried on 30 feet timber piles. On this mat are carried hollow shafts, 16 by 20 feet at the base and tapering to about 8 feet 6 inches by 17 feet under the coping. These shafts have walls 3 feet thick at the base and 2 feet at the top. They are about 114 feet high, and have a side batter of 1 in 50 and a long batter of about 1 to 35, to 1 to 42 above ground. The enclosing cofferdams are of steel sheet piling, about 38 by 104 feet in size, and about 60 feet deep with steel bracing, allowing all concrete to be placed in the dry.

The total length of the bridge is 4,490 feet 2 inches, the length between pylons is 2,886 feet and the height above the Cuyahoga River, 140 feet.

The excavation and fill on the project amounts to 90,000 cubic yards, there will be approximately 50,000 cubic yards of concrete in the footings, piers and retaining walls, and 10,000 cubic yards in the deck and a total of about 13,000 tons of structural steel in the bridge.

## Various Activities of New York Consulting Engineer

INCREASING activity and the renewal of inquiries regarding work to be undertaken in the immediate future is reported from the offices of CORNELIUS C. VERMEULE, 38 Park Row, New York City. Recently a survey and report on the improvement of Lake Musconetcong in New Jersey was completed by Lieut. Col. Cornelius V. Vermeule, Jr., for the Morris Canal & Banking Co., Trustees for the State of New Jersey. Plans and specifications have been prepared and the contract will shortly be awarded. The work will involve raising the dam, dredging, clearing and the creation of marginal parks.

Recent construction includes the sewage disposal plant and intercepting sewer for the City of Corning, New York, which was turned over to the municipality this spring, and a suspension bridge at Cranberry Lake, New Jersey, dedicated on May 30, 1931. A number of reports and investigations on water supply for municipalities in the vicinity of New York are being completed. A large part of Mr. Vermeule's time is devoted to expert testimony.

## Water and Sewerage Projects in the West

PLANS have been prepared by CLYDE C. KENNEDY, 543 Call Bldg., San Francisco, Calif., for a sewage treatment plant and trunk line sewers for Phoenix, Ariz., embracing mechanical bar screens, preliminary sedimentaries, activated sludge tanks, final sedimentation and chlorination, and the contracts awarded on May 28. A report for a unified water system has been prepared for Hillsborough and Burlingame, Calif. The construction of a sewage treatment plant and trunk sewers for Reno, Nevada, a complete sewer system and sewage treatment plant for Soledad, Calif., and an additional water supply line and reservoir with sand removal for Phoenix, Ariz., has been going on under Mr. Kennedy's supervision and is now practically completed.

Mr. Kennedy discussed the proposed sewage treatment plant for Phoenix before the Arizona Public Health Association at Nogales, Ariz., in May and before the San Diego Section, Am. Soc. C.E., at San Diego in April. He also spoke in April before the Saratoga Foothill Club, Saratoga, Calif., on Sanitary Engineering as a Protective Agency of the Modern Community.

## Engineering Offices Opened

ACCORDING to a recent announcement, HENRY EARLE RIGGS, for many years head of the department of Civil Engineering, University of Michigan, has established an office at 527 East Liberty Street, Ann Arbor, Mich., and will devote his entire attention to engineering practice. Mr. Riggs will give particular attention to problems growing out of railroad and public utility regulation. His services will be available as counsel in the preparation of engineering testimony for presentation to courts and commissions; for the valuation of properties and the organization of records of fixed property; studies of depreciation and trends of construction and operating costs, etc. Mr. Riggs does not desire to engage in any work of design or supervision of construction, and will not seek any work of a competitive nature.

## The Permeability of Portland Cement Concrete

BUILDING Research Technical Paper No. 3 entitled "The Permeability of Portland Cement Concrete" has recently been prepared by W. H. Glanville, D.Sc., Ph.D., A. M. Inst. C. E., for the Department of Scientific and Industrial Research and published by His Majesty's Stationery Office, London, England. The importance of permeability in determining the resistance of concrete to the various destructive influences which accompany the penetration of moisture is becoming more apparent as the field of knowledge of the properties of concrete extends. The work reported in this revised edition is a record of experiments carrid out some years ago. Nevertheless the necessity to bear in mind the fundamental principles set out still remains of first moment in the production of durable and watertight concrete.

Copies of this Bulletin may be secured in this country from the British Library of Information, 551 Fifth Avenue, New York City. The cost of this pamphlet is 45 cents, plus postage.

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# The Editor Comments—

### Hot Weather and Expansion Joints

Having spent the hot spell of the last week of June in Michigan and Wisconsin when the papers were reporting deaths by the hundreds in the Middle West, I had an opportunity to witness first-hand the weakness of the idea that expansion joints are not needed in concrete roads. There were hundreds of places in these two states and later many found in Minnesota, Iowa and Illinois, where the joints had crushed and the concrete spalled for some distance back from the joint.

Many of the breaks in the pavement were at curves showing the wisdom of expansion joints at the P. C. and P. T. as is specified in some states. Like our good friends in California we can say that the weather was "most unusual" but it did the trick of ruining many miles of otherwise perfectly good concrete pavement. A plea for more expansion joints and wider expansion joints is in order and we hope that most of the State Highway Departments will profit by the breaks of this last summer. Expansion joints are not expensive to install, but cutting the slab off cleanly with a portable pneumatic outfit and putting in a band of cold patch where the heave occurred is expensive and unattractive to motorists.

*Concrete Road Blown Up from Heat*

Some contractors object to installing expansion joints because they slow up production, but they are paid for the work and after all they are now running so fast with tandem pavers that they can pave faster than money is appropriated.

### Hell in a Cement Car

The inside of a cement car is no place for a respectable snowball in mid summer nor is it a place where a human being can last very long when the thermometer mounts into the nineties. Cement docks where normally five or six men cared for the handling of the cement with sufficient speed required ten and twelve during the hottest days of June and July so that the men could rest outside of the cars. Here is a new industry that has just come to the fore and in which man power must necessarily be replaced with machinery. There will surely be those who will cry "traitor" and talk of the all-too-great replacing of men by machines as the cause of unemployment. If there be such let them take a shovel and work for five hours in a cement car with the *outside* temperature at ninety-five and see whether he will not be a disciple of machines for that work at least. Even the men themselves who are earning their bread and butter realize that the work is torture and some even have seen the hazard to health and have used the respirators that many of the contractors have provided. Unfortunately some of the men are all too sensitive to the "kidding" of their fellow workers and have discarded the respirators after a day or two so that they might be one of the gang and not considered a weakling.

The great need of the road-building industry and the entire construction industry that is using bulk cement is a machine that does not depend on electric current but has a small gasoline motor that will move the cement from the cars to the bins. Many contractors have reported trying out or investigating the present machines but have gone back to hand labor because of cost and the question of reliability of operation. I have seen one machine in the experimental stage that promises well but it is operated electrically and not all the "bugs" had been worked out. It would pick up the cement, provided it had not become to densely packed in the car, and deliver it to the top of a bin fully 40 feet above the car and required but one man to operate it. It emptied several cars in the time that were usually required for the average crew of four or five men to empty one car.

### 3,078 Feet of Slab in One Day

The *Illinois State Register* for August 1 carried a news item from Lincoln, Ill., stating that a record run of 3,078 feet of slab was poured in a single day by Hartmann & Clark under a subcontract with the G. E. Hoffman Construction Company on Illinois State Route 48 between Farmer City and Weldon. This run was made in 13½ hours on July 28 and the pavement completed on July 29.

As has been mentioned several times before, records are wonderful to talk about and it is well understood why the above contractor made such a large run when the following day meant the completion of the job. Thirteen and one-half hours paving in one day is rather more than any contractor is going to run continuously, particularly with the increasing number of 8-hour-day laws in the mid-western states.

Set a high average and keep a uniform pace. Records in paving are meaningless.

Theodore Reed Kendall

# Construction Industry News

**Worthington Pump & Machinery Corp.**, Harrison, N. J., has announced that it has acquired the manufacturing and marketing facilities of **Metalweld, Inc.**, Philadelphia, Pa., builders of a complete line of portable compressor units. Worthington Feather Valve compressors always have been an integral part of Metalweld portable units. The Metalweld portable compressors will be manufactured at the Harrison, N. J. works of the Worthington organization. The engineering, manufacturing and sales personnel of the portable compressor division of the Metalweld organization will also be located there. Metalweld, Inc., will maintain its metal welding business and will act as the Worthington distributor in Philadelphia.

**Gardner-Denver Co.**, Quincy, Ill., has announced the appointment of the Hall-Perry Machinery Co., Butte, Mont., as its agent for sales and service of Gardner-Denver rock drills and portable compressors in Montana.

**Ohio Colprovia Co.**, with offices located at 406 Marion Bldg., Cleveland, Ohio, has recently acquired the license to manufacture and distribute Colprovia for the entire State of Ohio and has awarded a contract for the erection of its first plant at the Wagner Quarry Co.'s Soldier's Home Quarry No. 1, Sandusky, Ohio, which will have a capacity of approximately 750 tons daily, shipping Colprovia in open cars to any point in Ohio.

**Cleveland Tractor Co.**, Cleveland, Ohio, has recently received two large orders, totaling 153 crawler-type tractors, from the Pennsylvania State Highway Department. As a result of these orders, approximately 500 men have been returned to work by the Cletrac company.

**Waukesha Motor Co.**, Waukesha, Wis., has announced the opening of a Pacific Coast office located in the Rialto Building, 116 New Montgomery St., San Francisco, Calif. Herbert Wirshing, formerly the company's representative in the mid-continent oil fields, is in charge.

**Easton Car & Construction Co.**, Easton, Pa., has purchased the Industrial Division of the Lakewood Engineering Co., and hereafter will manufacture the complete line of Lakewood tier trucks, electric trucks, trailers, skids and industrial cars at Easton, Pa.

**O. K. Clutch & Machinery Co.**, Columbia, Pa., has recently received an order from the State of Pennsylvania for thirty-two portable air compressors to be distributed all over the state. Eighteen months ago eleven of these machines were sold to the state and the maintenance cost for the first year, including spares, was less than one per cent of the cost price, according to the manufacturer.

**Headley Emulsified Products Co.**, Franklin Trust Bldg., Philadelphia, Pa., has announced the appointment of J. G. Campazzie as Vice President, directing sales.

**Dardelet Threadlock Corp.**, New York City, has entered into a license agreement with the National Acme Co., of Cleveland, Ohio, and Windsor, Vt., permitting that company to manufacture, use, and sell bolts, nuts and screw machine products threaded with the Dardelet self-locking screw thread.

# Distributors' Bulletin Board

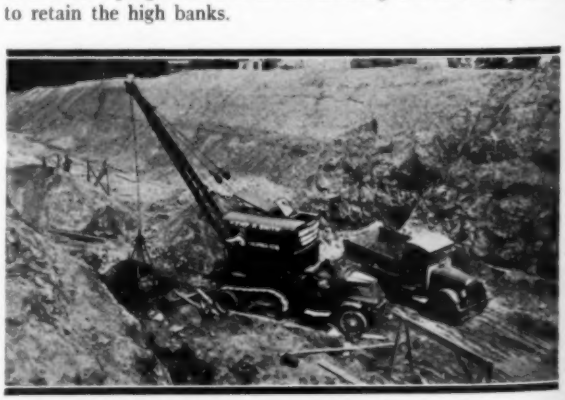
*The distributors of construction equipment listed below have made changes this month in their cards appearing in the Distributors' Directory on pages* 95 *to* 121 *of this issue of* CONTRACTORS AND ENGINEERS MONTHLY:

**Allegheny Equipment Corp., Pittsburgh, Pa.**
**Julien P. Benjamin, Inc., Jacksonville, Fla.**
**Bowen Machinery Co., Philadelphia, Pa.**
**Cyril J. Burke, Detroit, Mich.**
**C. F. Camp Co., Tulsa, Okla.**
**Canadian Equipment Co., Ltd., Montreal, Canada**
**Carolina Contractors' Equip. & Supply Co., Inc., Columbia, S. C.**
**Chadwick Machinery Co., San Antonio, Texas**
**Choctaw Culvert & Machinery Co., Memphis, Tenn.**
**Complete Machy. & Equip. Co., Inc., Long Island City, N. Y.**
**Corby Supply Co., St. Louis, Mo.**
**H. F. Davis Tractor Co., Inc., Boston, Mass.**
**Dyar Sales & Machinery Co., Cambridge, Mass.**
**General Construction Material Co., Ltd., Montreal, Canada**
**Hayes Equipment Co., Cleveland, Ohio**
**B. Hayman Co., Inc., Los Angeles, Cal.**
**Houck Equipment Co., Chicago, Ill.**
**Jenison Machinery Co., San Francisco, Cal.**
**E. A. Martin Machinery Co., Joplin, Mo.**
**Minneapolis Equipment Co., Minneapolis, Minn.**
**Nashville Tractor & Equipment Co., Nashville, Tenn.**
**E. I. P. Phillips Machinery Co., Richmond, Va.**
**M. B. Tyler Co., Springfield, Mass.**
**Western Road Machinery Co., Portland, Ore.**

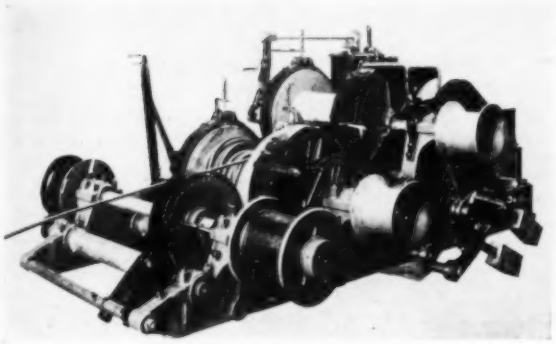
## Truck-Mounted Crane Solves Excavation Problem

THE contractor for the excavation of the footings for the tunnel section to carry the Rosslyn Branch of the Pennsylvania Railroad beneath the approaches to the Boundary Channel Bridge and the Arlington Memorial Bridge on the Virginia side struck some rather mean material. The work was located in a deep cut in Virginia clay and, after the preliminary excavation for the tunnel was completed, the deeper cuts at the edges of the first excavation struck a quicksand that flowed freely into the trench and made very heavy bracing of the wood sheeting necessary.

After a rain the cut was unworkable and for several days after it was difficult to operate a truck to take the spoil from the shovel. To be able to work successfully the contractor, Kemp P. Smith of Washington, D. C., used a Universal truck-crane mounted on crawlers. This shovel was able to wallow in the soft ground and move easily from one section to another as the work progressed and as the sheeting was driven by hand to retain the high banks.



*Digging the Tunnel Footings*



*A Mundy Hoist Equipped with the Safety Brake*

# A New Safety Device for Hoists

A NEW patented mechanically-operated safety device which has very few parts and parts which will not get out of order has been announced by the J. S. Mundy Hoisting Engine Co., Newark, N. J., for use on Mundy hoists. It is a safety brake which is set by weight, a safety brakeband, a safety brakelever arm of peculiar shape, and a safety brakelever weight that is released by the operator's foot lever connected with an arm and roller.

While handling the machine in the usual manner, by pressing down the working brake foot lever, the safety brake is set free and the working brake is in operation and lowers or holds the load as desired. Should the operator become disabled or take his foot off the foot lever, the safety brake weight drops and lifts the operating foot lever and with it frees the working brake and sets the safety brake which will hold the load without causing undue strain on the hoisting cable. No oil cylinders, motors, switches or springs are required in this simple safety device.

# Features of a Heavy-Duty 12-Foot Road Grader

WITH a completely riveted and welded frame, carrying a 3-point suspension for the blade, N. S. Monroe & Sons, Arthur, Ill., are building the Monroe Giant 12-foot road grader for particularly heavy work. The front bolster and axle is an I-beam of one piece making for sturdiness.

A swivel is built into the front pullbars of the blade to prevent twisting or distortion of the machine under load. The turnplate of the blade, which is 4 feet in diameter and 1 inch thick, is of high carbon steel. The yoke of the blade is built in one piece. The shift for the blade from side to side is a steel cut worm mounted in the center of the machine. There is a sliding equalizing yoke on the spring for lifting the blade. Everything in the machine is of steel, except the cast iron hand wheels which turn enclosed steel gears for the various operations. The steering wheel of the machine is adjustable from the left to the right side.

The main frame of the grader is built of 8-inch I-beams and it has a wheelbase of 18 feet. The moldboard of the 12-foot blade is 22 inches wide and reinforced. The lift spring is 4 feet long, making the lifting of the spring an easy operation. The rear wheels of the grader are 48 inches in diameter and the front wheels 30 inches in diameter. The two lifting wheels are each 50 inches in diameter, giving ample leverage for easy operation. The tongue for attaching to the tractor and through which the grader is steered is a 4-inch seamless tube operated by a 20-inch steering wheel. The grader complete weighs 8,500 pounds without the back sloper which weighs, with the necessary extras, approximately 300 pounds.

# A New 360-Cubic Foot Portable Compressor

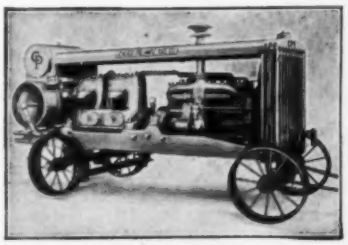
IN the new 360-cubic foot portable compressor recently announced by the Chicago Pneumatic Tool Co., 6 East 44th St., New York City, a four-cylinder-in-line compressor has been combined with a 6-cylinder heavy-duty Hercules engine to produce a unit, among the features of which are lack of vibration, full force lubrication of the compressor and engine, direct drive through a quickly detachable flexible coupling, counterweights forged integral with the compressor crankshaft, large compressor crankcase doors, affording complete accessibility to the bearings, a sectionalized radiator with steel protection bars and a fan guard and a one-piece steel deck.

The compressor is of the vertical, 4-cylinder single acting type. The cylinders which are completely water-jacketed are cast in pairs and bolted to the crankcase. Inlet and discharge valves are of the Simplate design, light, durable and simple in construction. The crankcase is made of close-grained cast iron and is well ribbed for strength. It is fitted with large oil tight removable doors, which give access to the interior for adjustments and cleaning. The oil pan, which is made of cast aluminum, has no oil lines connected to it and is easily removed. The piston is cast of close grained iron and is fitted with two ventilated oil control rings. The piston pin, of hardened steel, ground and polished, is of the full-floating type. A gear-type pump driven by the crankshaft forces oil under pressure to every moving part through the drilled crankshaft and connecting rods. A large oil strainer is provided and is shrouded by a bell-shaped cover so connected that should the strainer become clogged oil will be drawn by vacuum over the top of the strainer. A pressure gage is inserted in the system and a bayonet oil gage indicates the oil level. A flexible coupling connects the compressor and engine. By loosening four nuts on the coupling plate studs the engine and compressor can be disconnected.

The cooling water for the compressor and engine is circulated by the engine pump through a tubular radiator of large capacity cooled by a fan. A wire mesh guard encloses the fan, which is driven by three cog belts. When the air pressure in the receiver reaches a predetermined maximum, the unloader allows the air from the receiver to pass to the unloading inlet valves, holding them open and causing the compressor to operate unloaded. When the pressure in the receiver has dropped sufficiently, the unloader operates, venting the air from the valves and causing compression to be resumed. A device, known as the auto-pneumatic throttle, operating in conjunction with the unloader, slows down the engine to an idling speed during the unloaded periods and causes the engine to speed up just prior to loading up by the compressor so that the load is picked up by the engine without stalling.

The power plant of this unit is a Hercules Model HXE 6-cylinder, heavy-duty engine, equipped with underdraft manifold, double scavenging oil pump, large capacity water pump, Zenith carburetor, hot air stove, Bosch magneto and pressure system of lubrication.

This compressor unit can be mounted on steel wheels, or wide flanged solid rubber tired wheels with roller bearings. It can also be furnished on skids for semi-portable use or for motor truck mounting. It is also available mounted on a CP trailer, equipped with springs, wide flanged solid tired wheels and Timken roller bearings.



*The New CP 360-Cubic Foot Portable Compressor*

# An Improved Clamshell Bucket

*The New Williams Bucket*

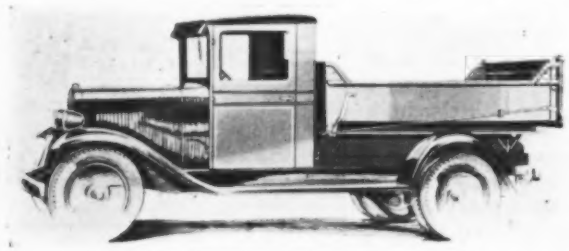
THE improved Champion bucket, recently announced by the G. H. Williams Co., 609 Haybarger Lane, Erie, Penna., is designed for heavy duty in material handling or excavating work. Its digging power is due to many improvements together with the original lever arm principle, providing straight cable leads which reduces the friction on all bearings to a minimum, as well as saving wear on sheaves, shafts and cable.

Additional leverage is secured by the use of extended corner brackets, which project well beyond the backs of the scoops. A narrower head of cast steel provides resistance to twisting strains, and extra-long roller guards of a new type and a large transverse roller protect the cable in all directions. Each corner pin has a T-head that fits into a slot in the corner bracket, to prevent turning as the bucket opens and closes, thus minimizing wear on the corner bar bushings and holding them in alignment.

# A New Hydraulic Dump Body for 1 to 3-Ton Trucks

A HEAVY-DUTY hydraulic dump body for 1 to 3-ton truck chassis, which can be stopped, held, lowered or raised from any position while the truck is standing still or in motion, and which is controlled entirely from the cab by means of two levers, is manufactured by Hercules Products, Inc., Evansville, Ind. The unit is simply and easily mounted on the chassis, by applying four U-bolts, hooking up the power take-off and connecting the levers. A power take-off is furnished with all bodies.

The body has a new type subframe enclosed at the sides, providing an improved appearance as well as protecting the mechanism. There are double gussets for wood or metal sideboards and a reinforced double-acting tailgate of the positive locking type. The subframe, which is independent and reinforces the chassis frame, carries the complete hoisting unit and body suspension brackets, thus absorbing all lifting strain and relieving the chassis.



*The New Hercules Hydraulic Dump Body*

The hoist is sturdy and powerful, with a heavy-duty 5-inch horizontal cylinder mounted in the subframe, and does not pivot in the dumping operation. It operates without any jerk on the truck or body and has a dumping angle of 55 degrees, reached in 5 to 7 seconds with a full load. The rear end of the body when elevated to full dumping position is level with the frame of the truck. Oil pressure is uniform from the start of the lift to the final dumping angle. A single valve control at the end of the cylinder eliminates the pump valve and the pump is of the heavy-duty type, with hardened ground gears and shaft and extra long bush bearings throughout.

# A New 7-Yard Crawler Wagon

A NEW 7-yard crawler wagon of the bottom-dump cart type, designed for dirt moving and hauling operations, has been announced by the Trackson Co., 1323 So. First St., Milwaukee, Wis. Among the features of this wagon are extra-strong front and rear ends, improved tongue and drawbar connections, a sturdy body that sheds the dirt, a simple, easily-operated door-winding device, light weight, renewable parts and crawler wheels.

The Trackson crawler wagon is built entirely of steel, with special reinforcements at the points of greatest wear and strain. At the front and rear ends are box-shaped cast steel headers. Extra-heavy 8-inch pipe provides a straight tubular tongue which is clamped between the two front header castings.

*The Trackson 7-Yard Crawler Wagon*

The tongue leads from an angle direct from the front header of the wagon to the tractor drawbar. Another feature is the complete enclosure of the drawbar spring in the end of the tubular tongue, thus protecting it from dust and dirt. This spring is an assembly in itself and can be removed from the drawbar for repairs by simply removing two bolts. The drawbar head is provided with two holes, the lower for use in connecting direct with the tractor drawbar and the upper hole for connecting to another wagon ahead when several wagons are hauled in tandem.

Without the flareboard, which may easily be removed or bolted on, the Trackson wagon has a loading height of 61½ inches, making it adaptable for use with elevating graders. Its high bottom clearance of 26 inches permits easy handling on the dump. A single lever is used for both dumping and winding up the doors, which are made of ⅜-inch steel plate, flanged and reinforced with angles. They are hinged on the inside of the body with flexible hinge connections which permit the doors to move upward if they come in contact with a stone or other solid object when in the dumped position. A cable equalizer keeps both doors shut tight. The wagon is equipped with Trackson 15-ton crawler wheels.

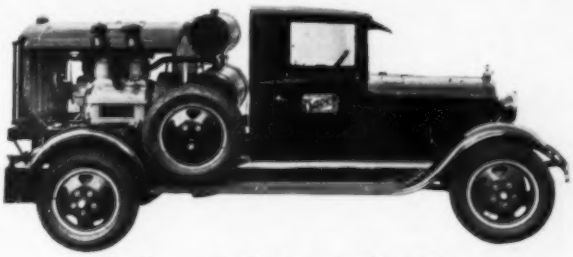
# A Tractor-Operated Trailer Scraper

*The Highway Trailer Scraper*

A HIGHWAY self-loading, quick action, rear-dump, two-wheel scraper which digs, scrapes, loads, elevates, hauls, dumps and distributes the soil where it is wanted and takes only one man to operate the entire unit is manufactured by the Highway Trailer Co., Edgerton, Wis. This scraper, which is tractor-operated, can be wheeled any distance without the loss of any part of the load and the entire outfit can be turned in a 24-foot circle, at an angle of 100 degrees. The plow steel cutting bit is reversible and easily changed and the tractor may be readily released for other use.

The scraper pan is carried on the axle in a channel steel frame, supported by two wheels and hooked to the tractor by a drawbar and pin. Power is taken from the rear of the tractor and carried to the scraper-transmission by a compound universal joint and drive shaft. Two levers control the distribution of power to the rakers by sprockets and chains, and to the raising and lowering of the pan by steel cables winding in sheaves. In starting, the pan is lowered to the desired depth and the rakers pull the dirt back from the bit, rising with the dirt as the pan continues to fill. When full, the pan is upended and wheeled any distance. Pulling a rope releases the latch of the dumping door, the door leveling the load to any suitable lift passing over it. The Caterpillar Thirty is recommended for use with the 3½-cubic yard scraper and the Caterpillar Sixty with the 5½-cubic yard scraper.

*A Homelite 2-Inch Portable Centrifugal Pump Used by a Contractor to Dewater a 12-Foot Trench*



*The Davey Air Compressor Mounted on a Ford Truck*

# A 110-Cubic Foot Air Compressor for Use on Small Trucks

A 110-cubic foot portable air compressor which is powered by a Ford Model A industrial motor and designed on a standard short wheelbase Ford truck chassis has been announced by the Davey Compressor Co., Kent, Ohio. Because of the Davey principle of air cooling through the use of metals of high heat-conducting capacity, excess weight has been eliminated, the combined weight of the compressor and motor being 2,100 pounds. The use of the Ford Model A motor for the compressor power plant provides interchangeability of parts between the truck and the compressor motor.

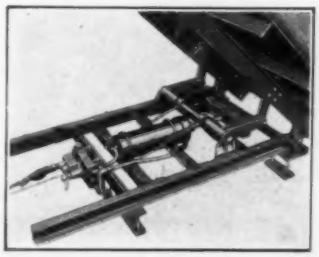
The motor drives the compressor through a clutch and V-belts, the compressor unit being started by cranking the motor only. With the motor running, the compressor starts pumping air with a one-finger pull on the clutch lever. An electric starter can be supplied for the compressor motor on special order.

This compressor can also be supplied on standard trailer mounting, using the same motor for powering the unit. On the trailer mounting, the total weight of the unit is approximately 2,400 pounds.

# A New Heavy-Duty Hydraulic Hoist

A NEW hydraulic hoist for Ford and Chevrolet bodies with a complete line of steel bodies has recently been announced by the Perfection Steel Body Co., Galion, Ohio. This hoist is designed for heavy-duty service and has as an outstanding feature the cushion drop mechanism, an automatic control which makes it possible to drop the body, either full or empty, very rapidly to the riding position without slamming the frame. The hydraulic cushion becomes effective when the body frame is within several inches of the chassis, easing it down to the full riding position.

The hoist raises the load to a full 50-degree angle in less than four seconds, according to the manufacturer, and returns it by controlled gravity to any intermediate position. An automatic valve mechanism provides a safety feature, holding the body in any raised position in case the power fails, the engine stops or the power clutch is released accidentally. The loaded body will also ride in any raised position on the hydraulic cushion. Similar units for larger capacity trucks will be announced soon.



*The Perfection Hydraulic Hoist for Dump Bodies*

# A Gas-Operated Jackhammer

*A Pair of Rodax Hammers at Work with No Auxiliary Equipment*

A NEW model jackhammer driven direct by a small gasoline unit mounted in the head has recently been placed on the market by the Rodax Corp., Chicago, Ill. This new model is 11 pounds lighter than the earlier model, weighing but 86 pounds and in spite of the lighter weight, is reported to have more power. The oil cooling chamber with the horizontal and movable fins has been eliminated as the cylinder is now being air-cooled with vertical fins.

Because of the portability of this unit which is complete in itself, requiring only a battery box in addition to the jackhammer, the Rodax is being used for both jackhammer work and as a mechanical tamper unit.

# A New Large Floodlight

PARTICULARLY suited to the lighting of large outdoor areas and construction projects where uniform lighting is required over a considerable area and at some distance from the location where the units are mounted, the new Big Ben floodlight has just been placed on the market by the Benjamin Electric Mfg. Co., Des Plaines, Ill.

This new open-type diffusing floodlight combines a powerful long range forward throw of light with adequate ground coverage in the areas near the unit. It is a combination of two distinctly different surfaces, consisting of a large inner reflector of oxidized aluminum surrounded by a larger porcelain enameled diffusing reflector.

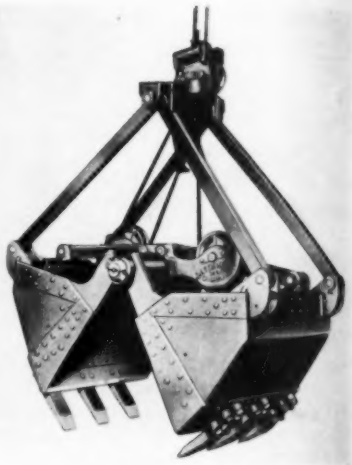
Uniform lighting over a wide area is obtainable with moderate mounting height with this unit and a spacing distance of as much as five times the mounting height may be used effectively between rows of units across the area to be lighted. A considerable amount of light is distributed forward and upward into the air, resulting in the uniform illumination of objects suspended above the ground. This permits adequate lighting of moving and stationary objects so that it is possible to see clearly the movements of industrial cranes, hoists and other construction machinery.

*The Benjamin Big Ben Floodlight*

This floodlight is very rugged and durable to withstand very severe weathering and atmospheric conditions.

# A New Clamshell Bucket

THE new Type N clamshell, recently announced by the Jos. F. Kiesler Co., 938 W. Huron St., Chicago, Ill., is improved in design and construction. In addition to many of the former Kiesler features, this new bucket has also redesigned double fulcrum digging arms, shells, cutting edges and teeth.



*The New Kiesler Type N Clamshell*

This bucket can penetrate freely and dump sticky materials quickly. There are no obstructions on the inside of the shells and all parts are built extra heavy.

# Road Oil Distributors

A ROAD oil distributor which may be mounted on a truck chassis and driven from a power take-off or which may have a separate motor drive and the complete installation placed in the dump body of a truck, is made by the Sacramento Engineering & Machine Works, Sacramento, Calif.

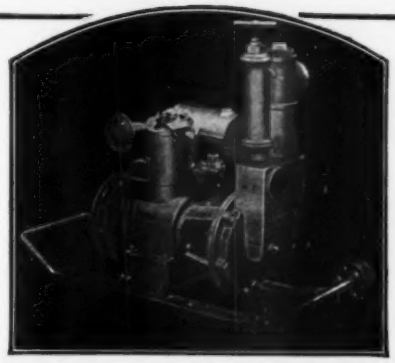
Standard equipment on the BLJ distributor includes a tachometer, oscillating manifold, oscillating spray bar, 16 Baker-type 3-way valves with nozzles, submerged 4-inch flange connected rotary pump with 3-way pump valves for pumping oil from trailer trucks or tank cars into the distributor, 2-inch asbestos insulation around the tank which is armored with a sheet-metal jacket, removable baffle or surge plates, removable manhole screen, operator's signal bell, drain valve, and complete gage and lever control. The tank is of 1,000-gallon capacity and is made of 3/16-inch boiler plate with ¼-inch heads. It is 9 feet long by 53 inches in diameter and is mounted on a 6-inch I-beam subframe.

The oscillating spray bar places the oil exactly according to specifications, regardless of the distance of the spray bar from the road. The bar may be adjusted to turn the valves to a vertical position, insuring a proper coating of material.

*The BLJ Road Oil Distributor*

## POSITIVE PRIMING PUMPS

Capacity 15,000 gallons per hour —25 ft. suction lift — positive priming, no foot valve required —3-inch suction, 3-inch discharge —handles dirty, gritty water, etc. Price complete as shown in the picture at the right $159.

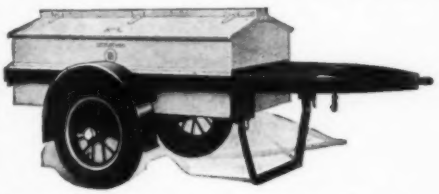


## AUTOMATIC PRIMING PUMPS

Capacity 3-in. pump 18,960 g.p.h., 4-in. pump 24,300 g.p.h.—29 foot suction lift — positive *automatic* priming—no valves—no floats—2 sizes—priced from $200 to $300 according to mounting and size as shown in the picture below.

*ASK FOR LITERATURE ON*
***HOISTS — PUMPS — AIR COMPRESSORS***
*Manufactured by*
**STERLING MACHINERY CORPORATION**
2300 HOLMES STREET KANSAS CITY, MO.

## A TOOL BOX THAT PROTECTS



Here is the Littleford Heavy-Duty Tool Box, with the strength of all-steel construction. Semi-elliptical springs, Timken bearings and pneumatic tires are an assurance of durability and high-speed trailing.

Practice economy by using a tool box that is built to give service in the highway construction and maintenance field.

Let us tell you all about it.

**LITTLEFORD BROS.**
*485 E. Pearl Street*
*Cincinnati, Ohio*

THE SIGN OF A GOOD HEATER
LB
LITTLEFORD BROS. CINCINNATI, OHIO

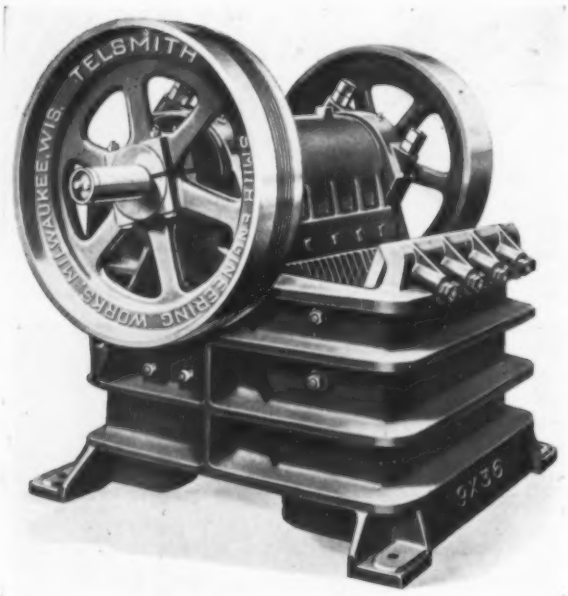
## D-A LUBRICANT

10 Years Service to Contractors "Always Uniform"

THE Semi-Fluid Lubricant for TRACTORS, TRUCKS, CRANES, SHOVELS and OTHER HEAVY DUTY EQUIPMENT.

"D-A" protects gears and bearings, prevents friction and wear and tear, reduces repair and replacement expense and keeps your equipment on the job through heat, mud, water, dust or grit. In addition to this great saving in your maintenance costs, D-A actually costs less to use, for it lasts many times longer than ordinary greases.

D-A LUBRICANT CO., INC.
INDIANAPOLIS, IND., U. S. A.
*Order from Your Dealer, Our Salesmen or Direct from Factory. Immediate Delivery.*




*The Telsmith-Wheeling Jaw Crusher*

## An Easily Adjusted Jaw Crusher

WITH the main structure consisting of a box-like casting made of annealed cast steel and reinforced by heavy horizontal ribs, and important improvements in the bearings, adjustments, and jaw clamping device, the Smith Engineering Works, Milwaukee, Wis., recently brought out the Telsmith-Wheeling jaw crusher. The walls and ribs of this crusher have been increased in thickness and the adjusting wedge and toggle-block slide on planed surfaces. The front end of the frame is machined to take the stationary jaw die. The swinging jaw is made of annealed cast steel with substantial vertical ribs. The front face is planed to fit the jaw die and the casting is bored accurately to take the anti-friction bearings. A replaceable toggle bearing is inserted between the toggle and the swinging jaw, protecting the jaw casting against toggle wear. The eccentric shaft both supports and actuates the swinging jaw. As this shaft takes a considerable portion of the crushing load, it is made of hammered carbon-vanadium steel, large in diameter, accurately finished, ground and polished. Thrust collars take all the wear due to end thrust and the entire shaft is readily removable.

Messinger bearings of the cylindrical roller type are used in both the swinging jaw and frame. The rollers are of heat-treated alloy-steel, operating in races of the same material. Both the stationary and swinging jaw plates are made of manganese steel with the back ground to a sure and accurate fit. Corrugated dies are furnished except for special cases and the dies are reversible. Both jaw plates are clamped rigidly in place by wedge blocks.

This type of crusher has a peculiar crushing action. The upper part of the swinging jaw moves outward to crush the coarse rock and then retreats. As the upper stroke terminates, the lower portion of the jaw moves forward to finish the crushing action and then recedes as a new cycle begins. This crushing stroke is said to be particularly effective in producing ½, 1 and 1½-inch rock. The length of the lower crushing stroke can be altered by changing the position of the toggle. While the toggle adjustments affect the discharge openings to some extent, the size of the finished product is usually regulated by the adjusting wedge and the sliding toggle block. This wedge-shaped block is raised or lowered by means of an adjusting screw or nut at the back of the crusher, thus moving the toggle block and swinging jaw forward or back to decrease or enlarge the discharge vent. The sliding toggle block carries three toggle seats, the lower one for the short stroke, the middle one for an intermediate stroke and the top one for the long stroke which is generally reserved for coarse rock and big capacities. Adjustment of the toggles can be made while the crusher is running. During operation, the adjusting wedge and sliding toggle block are wedged and bolted rigidly in place, preventing wear or breakage of the adjusting element.

## A New Light-Duty Tractor

MODEL 15, a new light-duty general utility tractor, has recently been announced by the Cleveland Tractor Co., Cleveland, Ohio. This new model has the usual Cletrac features, including power steering, an exclusive gear design which keeps the power on both tracks when turning, gravity oiling, positive traction and thorough sealing of moving parts against dust and dirt.

The unit is powered by a 4-cylinder, 4-cycle L-head motor with combined force feed and splash lubrication, a magneto with an impulse starter, a fly-ball governor, air clarifier, oil filter and rated 15-horsepower at drawbar. This tractor is very useful on small excavating and leveling jobs, dirt moving, street and road maintenance and similar work.

*A Fleet of Fifteen 800-Gallon Model F Etnyre Distributors Mounted on Autocar Chassis, Delivered to the U.S.S.R. a Few Months Ago*

# BETTER THAN EVER

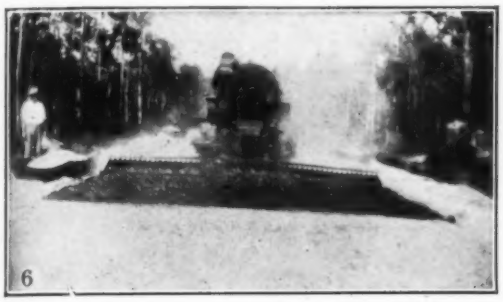
## *A SUPER OIL, TAR and ASPHALT DISTRIBUTOR*

— *for* Etnyre OREGON ILL. 1931 —

That is what
STATE OFFICIALS, COUNTY OFFICIALS and CONTRACTORS
will find embodied in the 1931

## "ETNYRE MODEL F"

**Designed and built to maintain and produce the best kind of BITUMINOUS ROADS by applying the material in just the right amount at the proper temperature.**




This is an actual photograph of an "ETNYRE MODEL F" applying 7/10 gallons per square yard, asphalt heated to 340 degrees F. with 18' spray bars on the Sanford-Orlando Road No. 3 in Florida. This is a splendid example of

"ETNYRE FULL WIDTH DISTRIBUTION"

The first application of 2 gallons per square yard was also applied with 18' spray bars.

Let us send you bulletin No. 503 giving specifications and more interesting facts.

***Manufactured by***

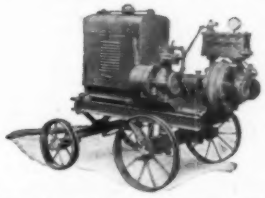
**E. D. ETNYRE & COMPANY**
**Oregon, Illinois**

***SALES OFFICES IN PRINCIPAL CITIES***

*The Real Pump for Contractors!*

## NEW "DOMESTIC"
## HI-LOW HEAD CENTRIFUGAL PUMPS

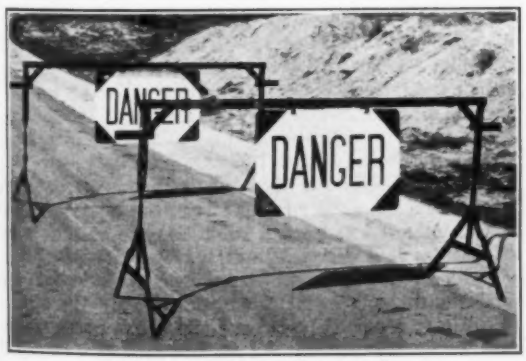
FULL BALL-BEARING CONSTRUCTION
WIDE RANGE OF CAPACITIES
HIGH AND LOW HEAD DUTIES COMBINED IN ONE PUMP



SELF-PRIMING OR NON-PRIMING UNITS
AMPLY POWERED BY 4-CYLINDER ENGINES
NEW LOW PRICES

***Write for New Bulletin NVC-31***

**DOMESTIC ENGINE & PUMP CO.** *Manufacturers* **SHIPPENSBURG, PENNA.**



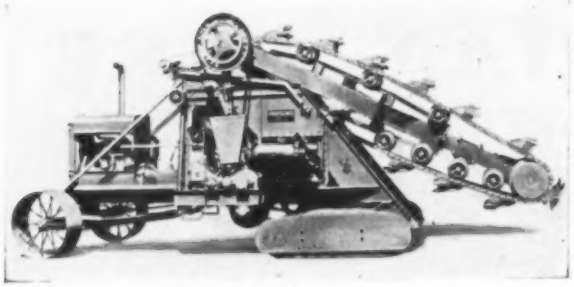

***Above:*** *McCurdy Road Guard in Use*
***At the right:*** *Collapsed for moving to the next job*

# McCurdy Road Guards

## All—Steel—Adjustable—Collapsible

It's a quick and easy matter to close a street to traffic while repairs are going on, if you own a pair of McCurdy Road Guards. They are easy to transport to the job—simply carry them collapsed on your running board. You can set one of these guards up in one minute—and take it down and collapse it in one minute when the job is finished. Being made of all-steel, a McCurdy Road Guard will stand all kinds of hard knocks and won't break or wear out in many long years. It's considered everywhere the most efficient and economical road guard obtainable for street repair work. Price $5.80 each. Write for our illustrated circular.

McCurdy Steel Products Company
Ada, Ohio



*A New Model 35 Pipe Line Trencher*

# A New Pipe Line Trencher

THE Parsons Model 35 pipe line trencher, embodying a number of new features, has recently been announced by the National Equipment Corp., No. 30th St. and W. Concordia Ave., Milwaukee, Wis. Among the features of this new trencher are an additional three-speed transmission, new heavy-duty Koehring type cast steel multiplanes, a wider conveyor belt, a 3-foot longer, stronger frame and an increased operating range and speed of excavation.

The additional 3 feet on the frame has allowed the introduction of an additional three-speed transmission directly behind the engine, which gives three speed ranges throughout the machine. This feature makes the machine adaptable to practically every soil condition. The conveyor has been equipped with a wider belt and the new design provides an effective dirt-carrying width 6 inches wider than in the old design. The belt is equipped with guide clips which prevent any movement of the belt off center. Cleats are also provided to prevent slippage of material. The fuel tank is equipped with a vacuum device by which the tank may be filled from a barrel standing on the ground.

The Parsons Model 35 can excavate to a depth of 15 feet and up to 4 feet in width. It is fast in ordinary soils and is well adapted to operate in rough country and in difficult soils including blasted lime rock, according to the manufacturer. It is suitable for digging pipe lines and for general trench excavating.

# A New Truck for Handling Stone

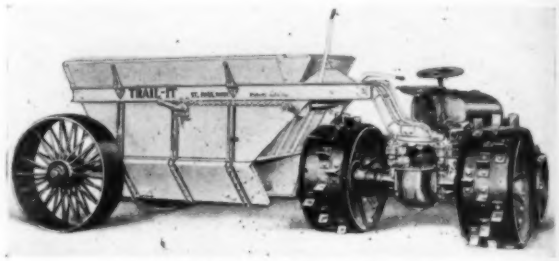
A NEW heavy-duty truck known as the Model 99 Hug Roadbuilder and designed especially to meet the severe conditions of stone handling has been announced by the Hug Co., Highland, Ill.

*A Model 99 Hug Roadbuilder Truck*

A feature of this truck, which has a pay load capacity of 30,000 pounds, is the set-back front wheel design which makes possible a short wheelbase and at the same time distributes part of the load over the front axle. Another feature is the new device known as the Hug front spring rocker, the purpose of which is to eliminate twisting, bending and the extreme stresses and strains and their resultant wear and tear on the truck. The details of this Hug spring rocker were described in the June issue of CONTRACTORS AND ENGINEERS MONTHLY, page 106.

This new model is powered with a Buda heavy-duty 6-cylinder truck engine 4¾ x 6, developing 126 horsepower at 1,850 rpm. It is equipped with a four-speed transmission and an auxiliary transmission, making possible twelve speeds forward and three reverse. Other equipment includes Overman heavy-duty cushion tires, two double reduction rear axles, both driven and each equipped with air brake.

The body of the truck is a 10-yard specially designed quarry body, made by the Easton Car & Construction Co., Easton, Penna. The body bed is built of ⅜-inch plate steel, with a reinforced bottom of 3-inch oak sills and ½-inch plate. A Wood W-8 special heavy-duty hoist completes the body equipment.




*A Sturdy Bottom-Dump Trailer*

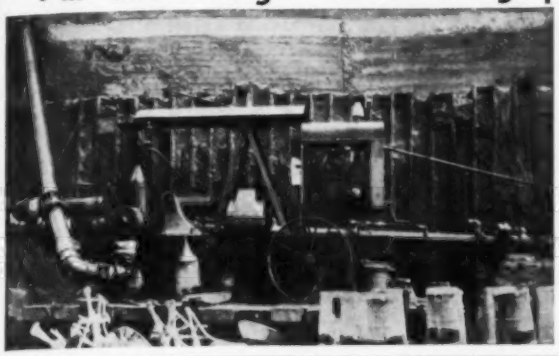
# Moving Big Loads Quickly Over All Ground Conditions

THE rapid developments in highway and levee building necessitate a dirt-moving unit capable of moving big loads at a rapid rate over all ground conditions. The Trail-It dump wagon, made by the Trail-It Co., St. Paul, Minn., is constructed of steel and spring-mounted. The wheels of the McCormick-Deering tractor and the wagon pack the fill as it is being made. Earth-moving operations can be speeded up, large loads carried, and the idle time of the loader or elevating grader reduced. The tractor windrows the dirt while in motion.

The wagons have a capacity of 3½ cubic yards water level and with side boards of 4 yards heaped capacity. The wheels are 48 inches in diameter with 12-inch crowned tires and a tread of 68 inches. The sides and ends of the wagon are made of steel and the bottom doors are of hickory. The doors raise up between the wagon box and the wheels, providing greater clearance and more flexibility. Cantilever spring suspension of the wagon gives easier riding and lighter draft. The tractor at 90 degrees to the wagon turns on its own axle center, an important feature when cuts and fills are narrow.

The load is stabilized through the spring-mounted fifth wheel action and is carried on the tractor to give it ample traction with correct balance, but subjecting the tractor only to such loads as it is designed to carry. A positive coupling is made with a 2-inch king pin. The spring cushioned safety stops protect the driver, the tractor and the wagon. The driver is easily able to handle the wind and trip levers which are very simple, handy and positive. All the load releases when the trip lever is lifted.

## All the tough dewatering jobs are MORETRENCH jobs!



*MORETRENCH MEANS THIS:*

*Moretrench Wellpoint*—270 inches of useful filter intake—thirty times as much as the ordinary point!

*Moretrench Header Pipe*—coupled with Moretrench Quick-couplings—goes together in one-tenth the time!

*Moretrench Combination Pump*—a self-priming centrifugal with a Moretrench vacuum pump,—8-inch bronze cylinder —4-inch stroke—lifts thirty feet—giving a high continuous vacuum.

*MORETRENCH KNOW HOW*—makes *every job* a *dry job.*

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*Works* ROCKAWAY, N. J.

*Sales Offices* 90 West Street, N. Y.

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HVASS

BITUMINOUS DISTRIBUTORS
HEAVY DUTY TRAILERS
SAND SPREADERS
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*Manufactured by*

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HVASS BITUMINOUS DISTRIBUTOR

## HERCULES ROLLERS

**WILL YOUR ROLLER DO THIS?**

A Hercules Roller travelled 95 miles under its own power from a railhead to the job in less than two ten-hour days—unheard of before the advent of this modern machine. Hercules Rollers are built to out-last, out-work, out-perform and overshadow ordinary rollers in continuous hard service—they dominate every job!

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THE HERCULES COMPANY—MARION, OHIO

## HOT WATER FOR COLD WEATHER WORK

***700 gallons per hour***
***125° F. in 3 Minutes***
***No "steam" troubles***

Illustration shows two Hauck Water Heaters supplying continuous Hot Water to a one-yard paver.

Only Hauck Water Heaters have the exclusive Hauck Hot Water Recirculation system that produces a steady supply of Hot Water. No "steam" troubles to cause cold water periods. . . . No delays. *Concrete discharges from 70° to 90° F. in any winter temperature.*

Be prepared to beat cold weather. Send for Bulletin No. 501, which describes this and other Hauck Winter Equipments.

HAUCK MFG. COMPANY
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HAUCK
OIL BURNING
WATER HEATER
*Burns Kerosene or Light Furnace Oil*

These especially selected catalogs and pamphlets of value to contractors are for free distribution. You will find it worth while to check these lists each month and write for the catalogs you need.

# SEND FOR THIS FREE LITERATURE

### A New Small Size Air Compressor

**205** Schramm, Inc., West Chester, Penna., will be glad to send to those interested complete information in regard to its new small portable gasoline-engine-driven 36-cubic foot air compressor which is especially adapted for operating a small size non-rotating type rock drill, trench digger or clay spade, backfill tamper and concrete brushing tools.

### Tunnel Liner Plates

**206** Truscon Steel Co., Pressed Steel Division, Cleveland, Ohio, will be glad to send to those interested Bulletin 1207 describing Truscon steel liner plates which make for speed, safety and economy in the construction of subways, tunnels or other underground passages, particularly through soft or crumbly earth, quicksand or ground under heavy pressure or full of water.

### A Heater for Enamel for Pipe Lines and Couplings

**207** The LB Hot Dope heater for enamel for use in coating pipe on main or service lines, on large pipe couplings or for waterproofing pipe is described in literature which Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio, will be glad to send on request.

### A Tractor-Operated Trailer Scraper

**208** The new Highway self-loading, quick-action, rear-dump two-wheel scraper which digs, scrapes, loads, elevates, hauls, dumps and distributes the soil where it is wanted and requires only one man to operate the entire unit, is described in literature which the Highway Trailer Co., Edgerton, Wis., will be glad to send on request.

### A Simplified Mounting for Vibrator Screens

**209** A complete description of the new stabilizer for mounting vibrating screens which holds the screen at a definite screening angle and yet offers no resistance to the vibrating action, may be secured by those interested from the Stephens-Adamson Mfg. Co., Aurora, Ill.

### A New Utility Power Unit

**210** Literature describing the new Kanawha utility power unit, a completely equipped crawler-type tractor with many service applications, may be secured by those interested from the Kanawha Manufacturing Co., Charleston, West Va.

### A New Addition to Line of Shovel Units

**211** The new Bucyrus-Erie 43-B 1½-1¾-yard shovel-dragline-crane-clamshell which may be secured with either diesel, gasoline or electric power, rope or chain crowd on the shovel, regular or special extra long and wide mountings for soft ground dragline work is described in literature which will be sent on request by the Bucyrus-Erie Co., South Milwaukee, Wis.

### Features of a Heavy-Duty 12-Foot Road Grader

**212** With a completely riveted and welded frame, and a 3-point suspension for the blade, N. S. Monroe & Sons, Arthur, Ill., is building the Monroe Giant 12-foot road grader for particularly heavy work. This grader and other Monroe road machinery are described in Catalog 34 which is available on request.

### Perforated Drainage Pipe

**213** A new well-illustrated 24-page catalog, No. 4, just issued by the Armco Culvert Mfrs. Assn., Middletown, Ohio, contains a complete description of Armco perforated pipe, the reasons for its development, its various applications and advantages, and complete instructions for ordering and installing.

### A Ditcher for Water, Sewer and Pipe Line Trenches

**214** The Austin Model 90 ditcher, a small compact and rugged machine designed to dig water, sewer, pipe line and conduit trenches up to 8 feet deep and 12 to 32 inches wide, is described in literature which the Austin Machinery Corp., Muskegon, Mich., will be glad to send on request.

### A Screening, Crushing and Loading Plant

**215** The No. 22 Pioneer portable screening, crushing and loading plant which has a capacity of 200 to 350 cubic yards in 10 hours, based on 1-inch reduction and 25 per cent oversize, which screens, crushes and loads in one operation, has a sand rejector and is operated by one man, is described in literature which the Pioneer Gravel Equipment Mfg. Co., 1515 Central Ave., Minneapolis, Minn., will be glad to send on request.

### Improvements in Truck Mixers

**216** Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis., will be glad to send to those interested complete information in regard to its improved Rex Moto-Mixer, among the features of which are the new controlled discharge for the concrete, the water control mechanism and the fact that the entire batch can be discharged, regardless of the level of the truck.

### Durable, Low-Cost Roads

**217** Colas Roads, Inc., 2201 Pershing Square Building, New York, has recently issued a new booklet, describing the construction of roads with Colas by various methods, resurfacing, treatment of bridge floors, airport surfacing and tennis courts. The booklet is well illustrated and copies may be secured on request.

### A New Retread Mixer

**218** A descriptive folder and complete information on the new Adams retread mixer which mixes and levels materials for road construction by the mixed-in-place method in one operation, producing a smooth riding surface, free from waves and irregularities, will gladly be sent on request by J. D. Adams Co., Indianapolis, Ind.

### A New Light-Duty Tractor

**219** Literature describing the new light-duty general utility tractor, designed for small excavating and leveling jobs, road and street maintenance and similar work, may be secured by interested municipal officials and contractors from the Cleveland Tractor Co., Cleveland, Ohio.

### Road Oil Distributors

**220** Sacramento Engineering & Machine Works, Sacramento, Calif., has issued a folder describing the BLJ road oil distributor which may be mounted on a truck chassis and driven from a power take-on or which may have a separate motor drive and the complete installation placed in the dump body of a truck.

### A Mechanical Lift Bulldozer

**221** The Hall mechanical lift bulldozer for use with the Cletrac 15 tractor, the blade of which is 53 inches wide by 24 inches high of ¼-inch plate with a cutting edge ⅜-inch by 6 inches, is described in literature which the Essex Tractor Co., 448 Washington Ave., Belleville, N. J., will be very glad to send on request.

### A Method of Grouting to Prevent Leakage

**222** Cementation Bulletin No. 301, issued by the Dravo Contracting Co., Neville Island Sta., Pittsburgh, Pa., describes the cementation process of grouting which solves many difficult construction and repair problems involving ground water, foundations, reservoir leakage, etc.

### A Crane for Loads up to 8,000 Pounds

**223** Complete descriptions of Baash-Ross industrial tractor cranes in standard and heavy models, which will lift loads as heavy as 8,000 pounds and carry them wherever a truck will go, may be secured without obligation from the Baash-Ross Tool Co., Los Angeles, Calif.

### Self-Propelled Air Compressors

**224** A self-propelled, four-wheel air compressor, capable of hauling other equipment behind itself and moving to, from and ahead on the job under its own power, is made by the Pontiac Tractor Co., Pontiac, Mich., who will be pleased to send complete information on request.

(Cut or tear along this line)

CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue, New York

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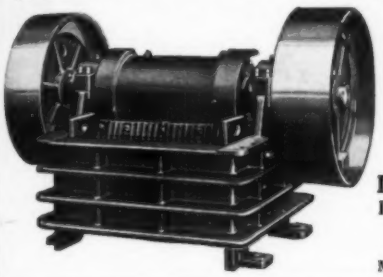
**DIAMOND ROLLER BEARING CRUSHER**

DIAMOND Timken Roller Bearing Crushers have two very important advantages not found in the average sleeve bearing crusher — they will operate on 40% less horsepower and save ninety per cent in lubrication costs.



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Minneapolis Minn. U. S. A.

Connery's Furnaces for pipe line work, lead melting furnaces, compound furnaces—made in various sizes—stationary and portable.

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4000 N. Second Street, Philadelphia, Pa.

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in sizes ranging in HP. from 3 to 180

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**"The Strongest Geared Power for Its Weight in the World"**

**CAPACITY 5 TONS STRAIGHT LINE**

**POSITIVE INTERNAL BRAKE**

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**Weight 110-lbs.**

**Size 16x17x13-in. high**

**Two Speeds 4 to 1 24 to 1**

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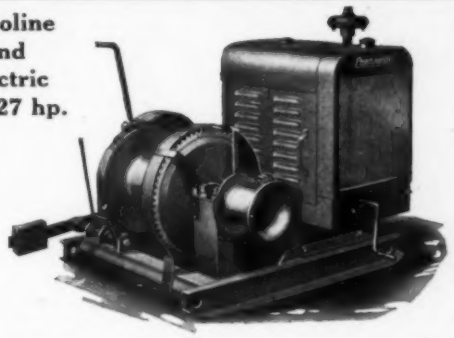

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**These desirable features are paramount in the design and construction of**

## DAKE Type "S-LG" Hoists

The rolled-steel base, standards and drums, arc-welded and braced with tubes and angles, give greater strength and rigidity. The more uniform strength and elasticity of rolled steel also makes them practically unbreakable.

Dake hoists have ample, reliable power units and every convenience for safe and efficient operation.

The elimination of all unnecessary weight makes them handier for setting up on the job and more suitable for elevating to upper stories of buildings under construction.

***Send for Bulletin 32***

**DAKE ENGINE COMPANY**

**Grand Haven, Mich., U. S. A.**

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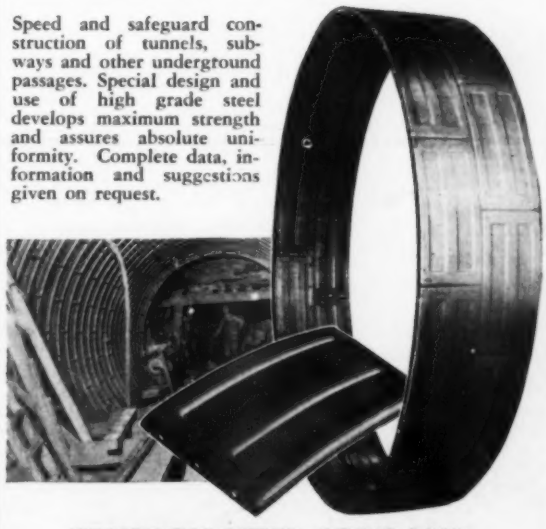
Speed and safeguard construction of tunnels, subways and other underground passages. Special design and use of high grade steel develops maximum strength and assures absolute uniformity. Complete data, information and suggestions given on request.



**TRUSCON STEEL COMPANY**

**CLEVELAND, OHIO**

***Sales and Engineering Offices in all Principal Cities***

### Equipment for Dewatering Jobs

**225** Literature describing Moretrench well points, header pipe, quick couplings and a combination pumping unit, consisting of a self-priming centrifugal with a Moretrench vacuum pump, an 8-inch bronze cylinder, a 30-foot lift and a high continuous vacuum, will be sent on request by the Moretrench Corp., 90 West St., New York City.

### Air Compressors and Rock Drills

**226** Thor air compressors with Rix Superchargers which are made in 36, 74, 120, 235, 280 and 310 cubic foot sizes and are available in all types of mountings, and Thor Cochise rock drills, which weigh 51 pounds, consume 60 cubic feet of air per minute and are furnished mounted or unmounted, are described in literature which the Independent Pneumatic Tool Co., 248 So. Jefferson St., Chicago, Ill., will be glad to send on request.

### Asphalts for Road Work

**227** Specifications and all other particulars in regard to Standard cut-back surfacing asphalt, asphalt binder A for surface treatment, binders B and C for penetration work, paving asphalt for asphaltic concrete, refined asphalt for sheet asphalt paving, cold patch asphalt for all types of patching, asphalt joint fillers and waterproofing asphalt may be secured from the Standard Oil Co. of New York, 26 Broadway, New York City.

### Wire Rope for Construction Use

**228** Williamsport wire rope, which is made of high grade steel and can be identified by the tape woven into the core of the rope showing the grade of steel used and insuring the selection of the proper kind of rope for safety and long life on the job, is described in literature which the Williamsport Wire Rope Co., Williamsport, Penna., will be glad to send on request.

### Expansion Joints for Concrete Roads

**229** Data, samples and prices on Carey Elastite expansion joints for use in concrete road construction, which make for service and long life of highways and which can be delivered to any part of the United States without delay, may be secured by those interested from the Philip Carey Co., Lockland, Cincinnati, Ohio.

### Centrifugally Moulded Cast Iron Pipe

**230** DeLavaud cast iron pipe which is moulded by the deLavaud centrifugal process, is light in weight, easy to handle and easy to cut and tap is described in the deLavaud handbook, a free copy of which may be secured by those interested from the United States Pipe & Foundry Co., Burlington, N. J.

### Serviceable Rubber Hose for Construction Jobs

**231** Continental Rubber Works, Erie, Penna., will be glad to send to those interested its contractors' catalog describing Continental Red Stripe hose for all types of construction jobs, as well as its other rubber products of interest to contractors.

### Tents and Tarpaulins

**232** Fulton Bag & Cotton Mills, 10 South Blvd., Atlanta, Ga., will be pleased to send to those interested samples and prices of its Fulton Quality tents and tarpaulins for the protection of workmen and equipment from all kinds of weather conditions.

### Heavy-Duty Trailers

**233** Rogers heavy-duty trailers, among the features of which are low loading height, lightness in proportion to capacity, the use of alloy steel, cast-steel wheels and heavy mill-type Timken bearings, are described in Catalog 28 which Rogers Bros. Corp., 108 Orchard St., Albion, Penna., will be glad to send on request.

### Asphalt Paving Machinery

**234** Complete information in regard to Hetherington & Berner portable asphalt plants of 100, 150 and 200-yard capacity, semi-portable and stationary plants of 500 to 4,000 yards and the complete one-unit portable patch plant may be secured by those interested from Hetherington & Berner, Inc., Indianapolis, Ind.

### Safe Highway Torches

**235** Complete information in regard to the Toledo torch, a safety light which stays lighted on the job and does not invite theft, may be secured from the Toledo Pressed Steel Co., Toledo, Ohio.

### Crushing and Screening Plants

**236** The 1931 Catalog describing in detail the full line of Diamond portable and semi-portable crushing, screening, washing and rock plants in a variety of types and sizes is available to interested contractors writing to the Diamond Iron Works, Inc., Minneapolis, Minn.

### A New Hoist With Welded Frame

**237** Street Bros. Machine Works, Inc., Chattanooga, Tenn., will be glad to send to those interested complete information in regard to its new double drum gasoline hoist with an electrically-welded frame.

### Trucks for Contractors

**238** An Operating Record Book as well as complete information in regard to the complete line of Dodge trucks for every kind and size of hauling job may be secured by interested contractors from Dodge Brothers Corp., Detroit, Mich.

### Means to Prevent Corrosion

**239** A new booklet entitled "Special Protective Coatings for Industry" has been issued by the Wailes Dove-Hermiston Corp., 17 Battery Place, New York City. This booklet is illustrated with photographs showing typical installations ranging from the Panama Canal lock gates, well known ocean vessels and other marine craft and structures to the world's greatest long-distance pipe lines, gas distribution systems, water works systems, penstocks and miscellaneous industrial structures such as tanks, bunkers and refinery equipment. A copy of this bulletin No. 505 will be sent to interested municipal officials or contractors upon request.

### A New Stockpile Loader

**240** Complete information in regard to the new Haiss Model 50, a stockpile loader with a capacity of from 1½ to 1¾ cubic yards per minute, handling materials in lumps not larger than 6 inches and weighing not more than 125 pounds per cubic foot, may be secured from the Geo. Haiss Mfg. Co., 142nd St. & Park Ave., New York City.

### A 2-inch Self-Priming Centrifugal Pump

**241** The Jaeger 10,000-gallon 2-inch self-priming centrifugal pump, among the features of which are self-priming in 10 to 50 seconds, self-adjusting gland, big water passages, one-man mounting and a lift of over 25 feet against a head up to 55 feet, is described in literature which may be secured from the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio.

### A New Catalog on Crawler Tracks

**242** LaPlant-Choate Manufacturing Co., Cedar Rapids, Iowa, will be glad to send to those interested its new 16-page catalog describing LaPlant-Choate Roadlayer tracks for dump wagons, which lay their own tracks.

### A Self-Contained Gas-Operated Jackhammer

**243** The new model Rodax jackhammer which is a self-contained unit capable of operating as a jackhammer or as a mechanical tamper has been announced by the Rodax Corp., Chicago, Ill., which will be pleased to send a complete description upon request.

### A New Clamshell Digging Bucket

**244** Jos. F. Kiesler Co., 938 W. Huron St., Chicago, Ill., will be glad to send to those interested complete information in regard to the new and improved Type N clamshell digging bucket, among the features of which are redesigned powerful double fulcrum digging arms, shells, cutting edges and teeth.

### A New Large Floodlight

**245** Literature describing the Big Ben open type diffusing floodlight which combines a powerful long range forward throw of light with adequate ground coverage in the areas near the unit, is available from the Benjamin Electric Mfg. Co., Des Plaines, Ill.

### Self-Starters for Construction Equipment

**246** Electric Auto-Lite Co., Toledo, Ohio, will be glad to send to those interested complete information in regard to Auto-Lite self-starting, lighting and ignition units for construction equipment, which are designed to save time and reduce costs.

### Derricks and Winches

**247** Full information in regard to the complete line of Sasgen derricks and winches for all types of work may be secured by those interested from the Sasgen Derrick Co., 3101 Grand Ave., Chicago, Ill.

### An Easily Adjusted Jaw Crusher

**248** Telsmith Bulletin No. 265, issued by the Smith Engineering Works, Milwaukee, Wis., describes the Telsmith Wheeling jaw crusher which consists of a box-like casting made of annealed cast steel and reinforced by heavy horizontal ribs, and which has many improvements in the bearings, adjustments and the jaw clamping device.

### Car Unloaders and Portable Conveyors

**249** Burch Corp., Crestline, Ohio, will be glad to send to those interested literature describing Burch car unloaders and portable conveyors as well as its other line of stone spreaders, crack fillers and power maintainers.

### Shovels and Cranes for Heavy Work

**250** Complete information in regard to the Osgood Commander, Challenger, Conqueror, Victor and railroad convertible cranes and shovels, which range in capacity from ⅜ to 6 yards and which are gasoline, steam, electric or diesel driven, may be secured by interested contractors from the Osgood Co., Marion, Ohio.

### A Crane for Heavy Lifting and Piling Jobs

**251** Lidgerwood Manufacturing Co., Elizabeth, N. J., will be glad to send to those interested complete information in regard to the Lidgerwood-Otis A crane, which has a speed of 12 miles per hour, a capacity of 4,000 pounds, a 2,000-pound counterweight to give traction and stability, and heavy steel construction throughout.

### Sewage Screens and Clarifiers

**252** Bulletins describing Dorr equipment for sewage treatment, including Dorr bar screens, clarifiers, sludge pumps and gas-collection digesters, as well as full information in regard to the various ways in which Dorr equipment can be applied to the various methods of treating sewage, will be furnished on request by the Dorr Co., 247 Park Ave., New York City.

### 3 to 4-Yard Tractor Dump Wagons

**253** Ohio Locomotive Crane Co., Bucyrus, Ohio, will be glad to furnish on request full information in regard to Ohio tractor dump wagons with a capacity of 3 to 4 yards, and which are equipped with crawlers, wheels, or rubber tires, interchangeable in the field.

### Dump Wagons for Difficult Earth-Moving Jobs

**254** Complete information in regard to Marion Mules, the oscillating front axle of which permits an even haul over uneven roads, excavations or fills and which may be equipped with rubber tires, steel wheels or crawlers, will be furnished on request by Marion Mules, Inc., Marion, Ohio.

### An Improved Clamshell Bucket

**255** G. H. Williams Co., 609 Haybarger Lane, Erie, Penna., will be glad to send to those interested complete information in regard to the new improved Williams Champion clamshell bucket which is designed for heavy duty in material handling and excavating work.

### A New 360-Cubic Foot Portable Compressor

**256** Bulletin No. 755, describing and illustrating the new CP 360-cubic foot portable air compressor which is powered with a 6-cylinder Hercules engine and may be secured in a number of mountings to meet individual requirements may be secured by those interested from the Chicago Pneumatic Tool Co., 6 East 44th St., New York City.

### An Hydraulic Dump Body

**257** Literature describing the Hercules hydraulic dump body for 1 to 3-ton truck chassis which are sturdy and rugged, are easily and simply mounted and are controlled entirely from the cab of the truck by means of two levers, will be sent on request by Hercules Products, Inc., Evansville, Ind.